INSTALLATION INSTRUCTION

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SAVE THIS MANUAL

PREDATOR™

SINGLE PACKAGE AIR CONDITIONERS AND SINGLE PACKAGE GAS/ELECTRIC UNITS

DM/DH078 THROUGH 150

(6-1/2 TO 12-1/2 TON)

(9.0 TO 11.5 EER)

DM/DH 078

090

102

120

150

Tested in accordance with:

035-17377-000 REV A (0201)

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D H 120 N 15 A 2 A AA 1 A

TABLE 1: PRODUCT NOMENCLATURE

Model #	Model Number Description	Options		
D	Product Category	D = Air Conditioner, Single Package		
H	Product Identifier	M = Standard Efficiency	H = High Efficiency	
120	Nominal Cooling Capacity MBH	078 = 6-1/2 Ton 090 = 7-1/2 Ton	102 = 8-1/2 Ton 120= 10 Ton	150 = 12-1/2 Ton
N	Heat Type	C = Cooling Only	N = Natural Gas, Aluminized Steel	S = Natural Gas, Stainless Steel
15	Nominal Heating Capacity*	00 = No Heat Installed 10 = 100 MBH Output Gas Heat	15 = 150 MBH Output Gas Heat	20 = 200 MBH Output Gas Heat
A	Airflow	A = SM B = SM/EC/BR C = SM/EC/PE	D = SM/MD N = High Static Motor P = High Static Motor/EC/BR	Q = High Static Motor/EC/PE R = High Static Motor/MD
2	Voltage	2 = 208/230-3-60	4 = 460-3-60	5 = 575-3-60
A	Installation Options	A= None B = 1 C = 2 D = 1 & 2E = 3 F = 4	G = 1 & 3 H = 1 & 4 J = 1, 2 & 3 K = 1, 2 & 4 L = 1, 3 & 4	M = 1, 2, 3 & 4 N = 2 & 3 P = 2 & 4 Q = 2, 3 & 4 R = 3 & 4
AA	Additional Options	AA = None AB = PM AC = CG AD = DFS AE = PM & CG AF = PM & DFS AG = CG & DFS AH = PM, CG & DFS NA = NC NB = NC & PM	NC = NC & CG ND = NC & DFS NE = NC, PM & CG NF = NC, PM & DFS NG = NC, CG & DFS NH = NC, PM, CG & DFS NJ = NC, TCC & PM NK = NC, TCC & CG NL = NC, TCC & DFS NM = NC, TCC, PM & CG	NN = NC, TCC, PM & DFS NP = NC, TCC, CG & DFS TA = TCC TB = TCC & PM TC = TCC & CG TD = TCC & DFS TE = TCC, PM & CG TF = TCC, PM & DFS TG = TCC, CG & DFS TH = TCC, PM, CG & DFS
1	Product Generation	1 = First Generation		
A	Product Style	A = Style A		

*. See Table 49 for the heating options available for each unit.

TABLE 2: AIRFLOW ABBREVIATIONS

ABBREVIATION	MEANING
BR	Barometric Relief
EC	Economizer
MD	Motorized Damper
PE	Power Exhaust
SM	Standard Motor

TABLE 3: INSTALLATION ABBREVIATIONS

ABBREVIATION	MEANING
1	Disconnect
2	Convenience Outlet
3	Smoke Detector Supply Air
4	Smoke Detector Return Air

TABLE 4: ADDITIONAL OPTIONS ABBREVIATIONS

ABBREVIATION	MEANING
CG	Coil Guard
DFS	Dirty Filter Switch
NC	Novar® Controller
PM	Phase Monitor
TCC	Technicoat Condenser Coil

⚠ WARNING

If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

WHAT TO DO IF YOU SMELL GAS

a. Do not try to light any appliance.

b. Do not touch any electrical switch; do not use any phone in your building.

c. Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.

d. If you cannot reach your gas supplier, call the fire department.

Installation and service must be performed by a qualified installer, service agency or the gas supplier.

GENERAL

YORK® Predator™units are single package air conditioners with optional gas heating designed for outdoor installation on a rooftop or slab and for non-residential use. These units can be equipped with field installed electric heaters for heating applications.

These units are completely assembled on rigid, permanently attached base rails. All piping, refrigerant charge, and electrical wiring is factory installed and tested. The units require electric power, gas supply (where applicable), and duct connections. The electric heaters have nickel-chrome elements and utilize single-point power connection.

SAFETY CONSIDERATIONS

⚠ WARNING

Should overheating occur, or the gas supply fail to shut off, shut off the manual gas valve to the furnace before shutting off the electrical supply.

Do not use this furnace if any part has been under water. Immediately call a qualified service technician to inspect the furnace and to replace any part of the control system and any gas control which has been under water.

Due to system pressure, moving parts, and electrical components, installation and servicing of air conditioning equipment can be hazardous. Only qualified, trained service personnel should install, repair, or service this equipment. Untrained personnel can perform basic maintenance functions of cleaning coils and filters and replacing filters.

Observe all precautions in the literature, labels, and tags accompanying the equipment whenever working on air conditioning equipment. Be sure to follow all other applicable safety precautions and codes including ANSI Z223.1 - latest edition. Wear safety glasses and work gloves. Use quenching cloth and have a fire extinguisher available during brazing operations.

NOTES CAUTIONS AND WARNINGS

Installer should pay particular attention to the words: NOTE, CAUTION, and WARNING. Notes are intended to clarify or make the installation easier. CAUTIONS are given to prevent equipment damage. WARNINGS are given to alert installer that personal injury and/or equipment damage may result if installation procedure is not handled properly.

APPROVALS

Design certified by CSA as follows:

1. For use as a cooling only unit, cooling unit with supplemental electric heat or a forced air furnace.
2. *For outdoor installation only.*
3. For installation on combustible material and may be installed directly on combustible flooring or, in the U.S., on wood flooring or Class A, Class B or Class C roof covering materials.
4. For use with natural gas (convertible to LP with kit).

REFERENCE

Additional information is available in the following reference forms:

- - Technical Guide
- - General Installation
- - Pre-start & Post-start Check List
- - Economizer Accessory
- - Motorized Outdoor Air Damper
- - Manual Outdoor Air Damper (0-100%)
- - Manual Outdoor Air Damper (0-35%)
- - Gas Heat Propane Conversion Kit
- - Gas Heat High Altitude Kit (Natural Gas)
- - Gas Heat High Altitude Kit (Propane)
- - –60°F Gas Heat Kit
- - Electric Heater Accessory
- - Low Ambient Accessory
- - Unit Renewal Parts List

All forms referenced in this instruction may be ordered from:

Standard Register
2101 West Tecumseh Road
Norman, OK 73069
Toll Free Fax: (877) 379-7920
Toll Free Phone: (877) 318-9675

INSPECTION

As soon as a unit is received, it should be inspected for possible damage during transit. If damage is evident, the extent of the damage should be noted on the carrier's freight bill. A separate request for inspection by the carrier's agent should be made in writing.

⚠ WARNING

This furnace is not to be used for temporary heating of buildings or structures under construction.

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury. Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to this manual. For assistance or additional information consult a qualified installer, service agency or the gas supplier.

INSTALLATION

PRECEDING INSTALLATION

1. Remove the two screws holding the brackets in the front, rear and compressor side fork-lift slots.

FIGURE 1 : UNIT SHIPPING BRACKET

2. Turn each bracket toward the ground and the protective plywood covering will drop to the ground.
3. Remove the condenser coil external protective covering prior to operation.
4. Remove the toolless doorknobs and instruction packet prior to installation.

LIMITATIONS

⚠ CAUTION

This product must be installed in strict compliance with the enclosed installation instructions and any applicable local, state and national codes including, but not limited to, building, electrical, and mechanical codes.

The furnace and its individual shut-off valve must be disconnected from the gas supply piping system during any pressure testing at pressures in excess of 1/2 PSIG.

Pressures greater than 1/2 PSIG will cause gas valve damage resulting in a hazardous condition. If it is subjected to a pressure greater than 1/2 PSIG, the gas valve must be replaced.

The furnace must be isolated from the gas supply piping system by closing its individual manual shut-off valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 PSIG

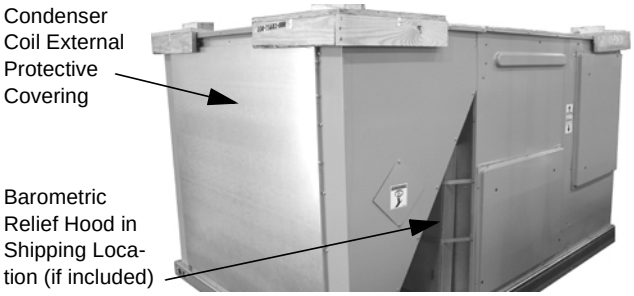


FIGURE 2 : CONDENSER COVERING

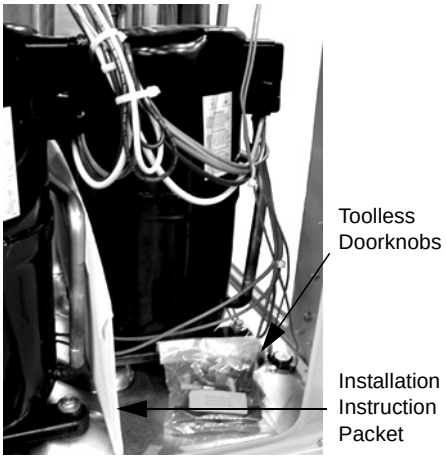


FIGURE 3 : COMPRESSOR SECTION

These units must be installed in accordance with the following:

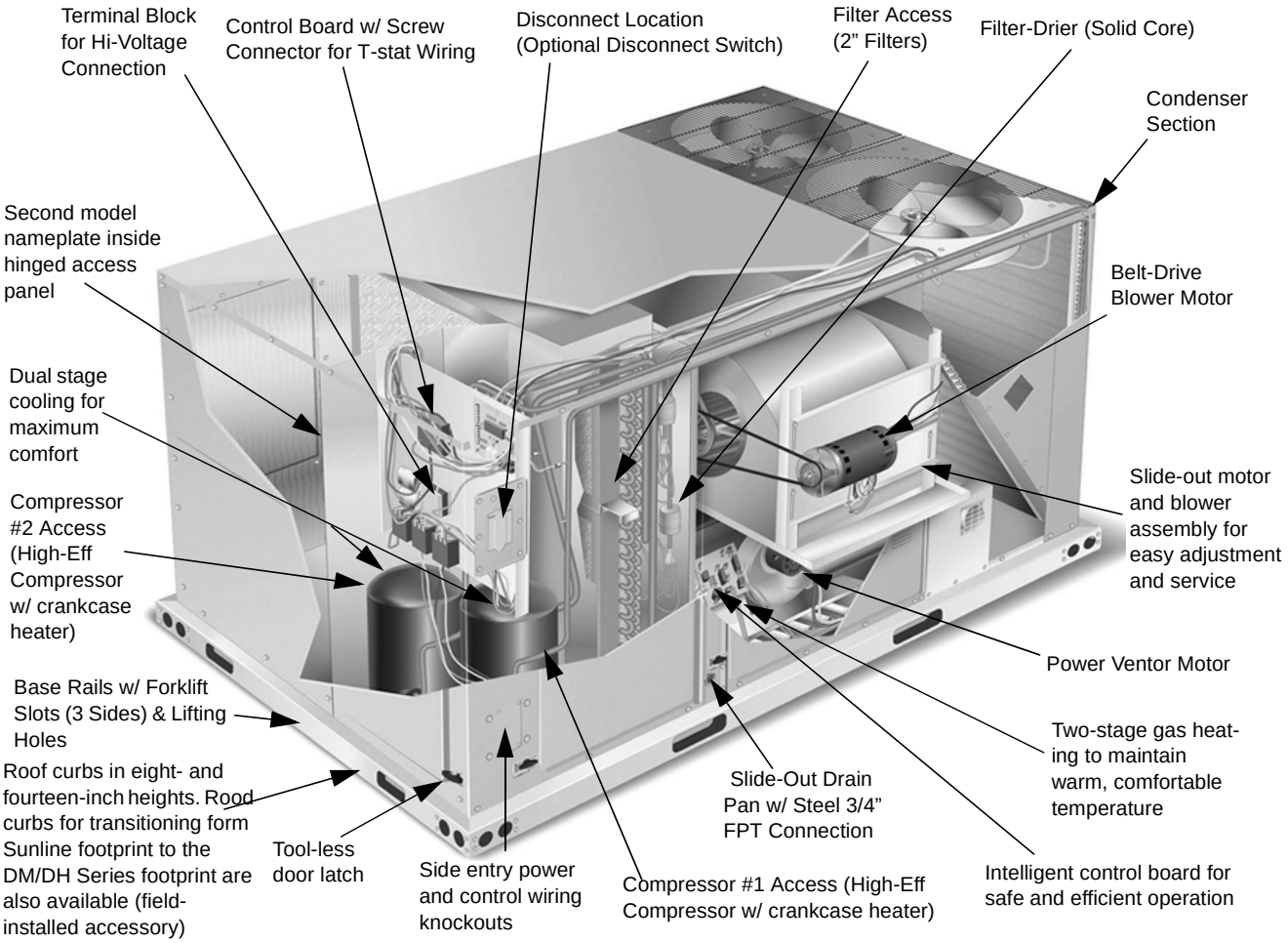

Terminal Block for Hi-Voltage Connection
Control Board w/ Screw Connector for T-stat Wiring
Disconnect Location (Optional Disconnect Switch)
Filter Access (2" Filters)
Filter-Drier (Solid Core)
Condenser Section
Second model nameplate inside hinged access panel
Belt-Drive Blower Motor
Dual stage cooling for maximum comfort
Compressor #2 Access (High-Eff Compressor w/ crankcase heater)
Slide-out motor and blower assembly for easy adjustment and service
Power Ventor Motor
Base Rails w/ Forklift Slots (3 Sides) & Lifting Holes
Two-stage gas heating to maintain warm, comfortable temperature
Roof curbs in eight- and fourteen-inch heights. Rood curbs for transitioning form Sunline footprint to the DM/DH Series footprint are also available (field-installed accessory)
Tool-less door latch
Side entry power and control wiring knockouts
Slide-Out Drain Pan w/ Steel 3/4" FPT Connection
Compressor #1 Access (High-Eff Compressor w/ crankcase heater)
Intelligent control board for safe and efficient operation

FIGURE 4 : PREDATOR™ COMPONENT LOCATION

In U.S.A.:

1. National Electrical Code, ANSI/NFPA No. 70 - Latest Edition
2. National Fuel Gas Code, ANSI Z223.1 - Latest Edition,
3. Gas-Fired Central Furnace Standard, ANSI Z21.47 - Latest Edition
4. Local building codes, and
5. Local gas utility requirements.

In Canada:

1. Canadian Electrical Code, CSA C22.1,
2. Installation Codes, CSA - B149,
3. Local plumbing and waste water codes, and
4. Other applicable local codes.

Refer to Tables 5 & 6 for unit application data.

After installation, gas fired units must be adjusted to obtain a temperature rise within the range specified on the unit rating plate.

If components are to be added to a unit to meet local codes, they are to be installed at the dealer's and/or customer's expense.

Size of unit for proposed installation should be based on heat loss/heat gain calculation made according to the methods of Air Conditioning Contractors of America (ACCA).

TABLE 5: UNIT VOLTAGE LIMITATIONS

Power Rating*	Minimum	Maximum
208/230-3-60	187	252
460-3-60	432	504
575-3-60	540	630

*. Utilization range "A" in accordance with ARI Standard 110.

TABLE 6: UNIT TEMPERATURE LIMITATIONS

Temperature	Min.	Max.
Wet Bulb Temperature (°F) of Air on Evaporator Coil	57	72
Dry Bulb Temperature (°F) of Air on Condenser Coil	0*	125

*. A low ambient accessory is available for operation down to -20°F.

LOCATION

Use the following guidelines to select a suitable location for these units:

1. Unit is designed for *outdoor installation only*.
2. Condenser coils must have an unlimited supply of air. Where a choice of location is possible, position the unit on either north or east side of building.
3. Suitable for mounting on roof curb.
4. Roof structures must be able to support the weight of the unit and its options/accessories. Unit must be installed on a solid, level roof curb or appropriate angle iron frame.
5. Maintain level tolerance to 1/2” across the entire width and length of unit.

RIGGING AND HANDLING

Exercise care when moving the unit. Do not remove any packaging until the unit is near the place of installation. Rig the unit by attaching chain or cable slings to the lifting holes provided in the base rails. Spreader bars, whose length exceeds the largest dimension across the unit, **MUST** be used across the top of the unit.

⚠ CAUTION

If a unit is to be installed on a roof curb other than a YORK roof curb, gasketing must be applied to all surfaces that come in contact with the unit underside.

Before lifting, make sure the unit weight is distributed equally on the rigging cables so it will lift evenly.

Units may be moved or lifted with a forklift. Slotted openings in the base rails are provided for this purpose.

Length of forks must be a minimum of 60 inches.

⚠ CAUTION

All panels must be secured in place when the unit is lifted.

The condenser coils should be protected from rigging cable damage with plywood or other suitable material.

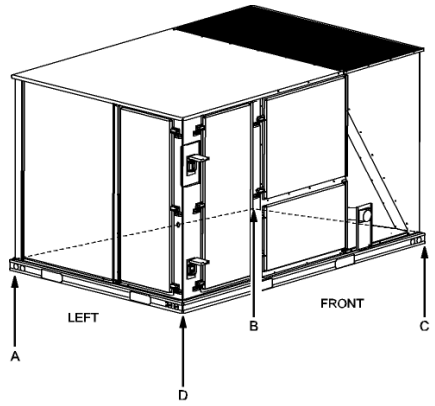


FIGURE 5 : UNIT 4 POINT LOAD

TABLE 7: UNIT WEIGHTS

Model	Shipping Weight* (lb.)	Operating Weight† (lb.)
DM078	1045	1041
DM090	1056	1051
DM102	1089	1084
DM120	1121	1116
DM150	1200	1195
DH078	1104	1099
DH090	1108	1103
DH102	1178	1173
DH120	1212	1207
DH150	1202	1197
Econ.	85	84
w/ PE	150	148
Elec. Heat[2]	49	49

*. Weights include largest gas heat option.

†. 54kW heater.

TABLE 8: 4 POINT LOAD WEIGHT

Model	Location (lbs.)*			
	A	B	C	D
DM078	228	195	285	333
DM090	230	197	287	336
DM102	238	203	296	347
DM120	245	209	305	357
DM150	262	224	327	382
DH078	241	206	300	352
DH090	242	207	301	353
DH102	257	220	321	375
DH120	265	226	330	386
DH150	263	224	327	383

*. Weights include largest gas heat option.

TABLE 9: 6 POINT LOAD WEIGHT

Model	Location (lbs.)*					
	A	B	C	D	E	F
DM078	156	140	127	185	205	228
DM090	158	142	128	187	207	230
DM102	163	146	132	192	213	237
DM120	168	151	136	198	219	244
DM150	180	161	145	212	235	262
DH078	165	148	134	195	216	241
DH090	166	149	134	196	217	242
DH102	176	158	143	208	231	257
DH120	181	163	147	214	237	264
DH150	180	161	146	213	235	262

*. Weights include largest gas heat option.

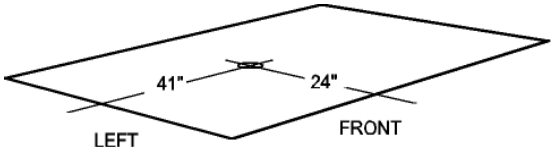


FIGURE 7 : UNIT CENTER OF GRAVITY

CLEARANCES

All units require particular clearances for proper operation and service. Installer must make provisions for adequate combustion and ventilation air in accordance with section 5.3

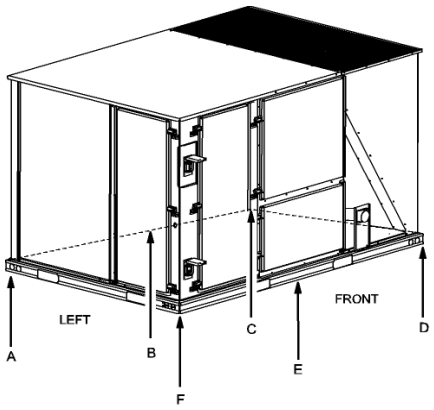


FIGURE 6 : UNIT 6 POINT LOAD

of Air for Combustion and Ventilation of the National Fuel Gas Code, ANSI Z223.1 – Latest Edition, or Sections 7.2, 7.3, or 7.4 of Installation Codes, CSA-B149 - Latest Edition, and/or applicable provisions of the local building codes. Refer to Table 10 for clearances required for combustible construction, servicing, and proper unit operation.

⚠ WARNING

Do not permit overhanging structures or shrubs to obstruct condenser air discharge outlet, combustion air inlet or vent outlets.

⚠ WARNING

Excessive exposure to contaminated combustion air will result in safety and performance related problems. To maintain combustion air quality, the recommended source of combustion air is the outdoor air supply. The outdoor air supplied for combustion should be free from contaminants due to chemical exposure that may be present from the following sources.

- Commercial buildings
- Indoor pools
- Laundry rooms
- Hobby or craft rooms
- Chemical storage areas

The following substances should be avoided to maintain outdoor combustion air quality.

- Permanent wave solutions
- Chlorinated waxes and cleaners
- Chlorine based swimming pool cleaners
- Water softening chemicals
- De-icing salts or chemicals
- Carbon tetrachloride
- Halogen type refrigerants
- Cleaning solvents (such as perchloroethylene)
- Printing inks, paint removers, varnishes, etc.
- Hydrochloric acid
- Cements and glues
- Anti-static fabric softeners for clothes dryers
- Masonry acid washing materials

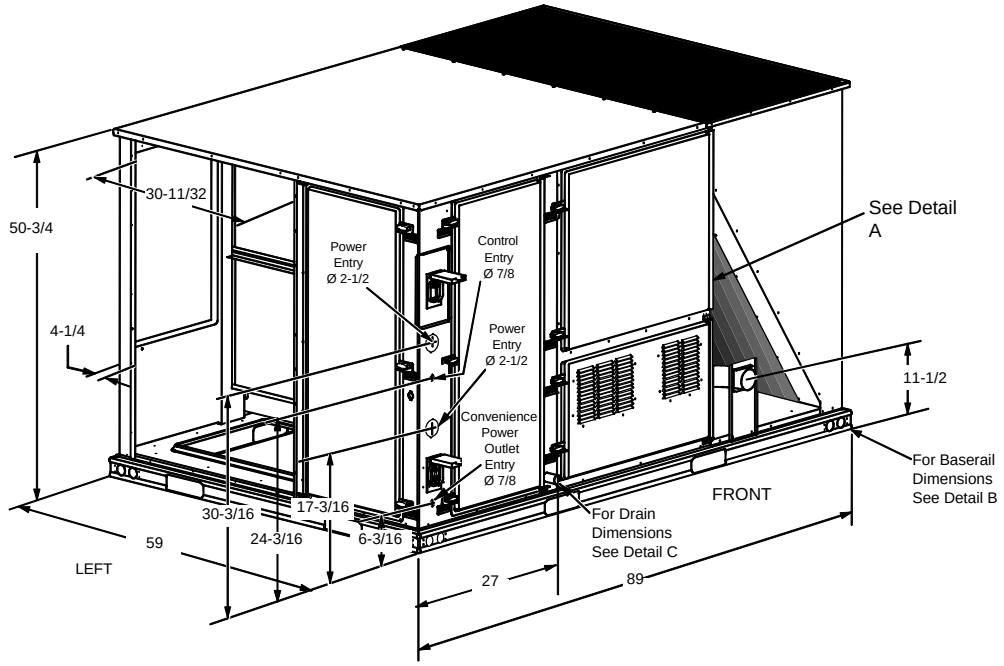
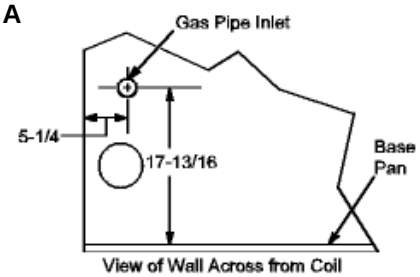
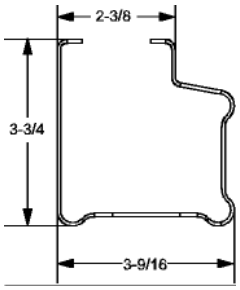


FIGURE 8 : UNIT DIMENSIONS

DETAIL A



DETAIL B



DETAIL C

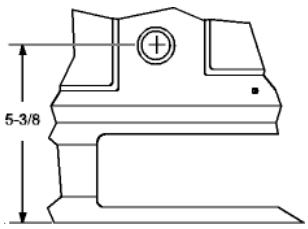


TABLE 10: UNIT CLEARANCES

Top*	72”	**Right**	12”
Front†	36”	**Left**	36”
Rear‡	36”	**Bottom****	0”

*. Units must be installed outdoors. Overhanging structure or shrubs should not obstruct condenser air discharge outlet.

†. The products of combustion must not be allowed to accumulate within a confined space and re-circulate.

‡. To remove the slide-out drain pan, a rear clearance of sixty inches is required. If space is unavailable, the drain pan can be removed through the front by separating the corner wall.

**. Units may be installed on combustible floors made from wood or class A, B or C roof covering materials.

NOTE: A one-inch clearance must be provided between any combustible material and the supply ductwork for a distance of 3 feet from the unit.

NOTE: If the unit includes gas heating, locate the unit so the flue exhaust is at least:

- Three (3) feet above any forced air inlet located within 10 horizontal feet (excluding those integral to the unit).
- Four (4) feet below, four (4) horizontal feet from, or one (1) foot above any door or gravity air inlet into the building.
- Four (4) feet from electric meters, gas meters, regulators, and relief equipment.

.

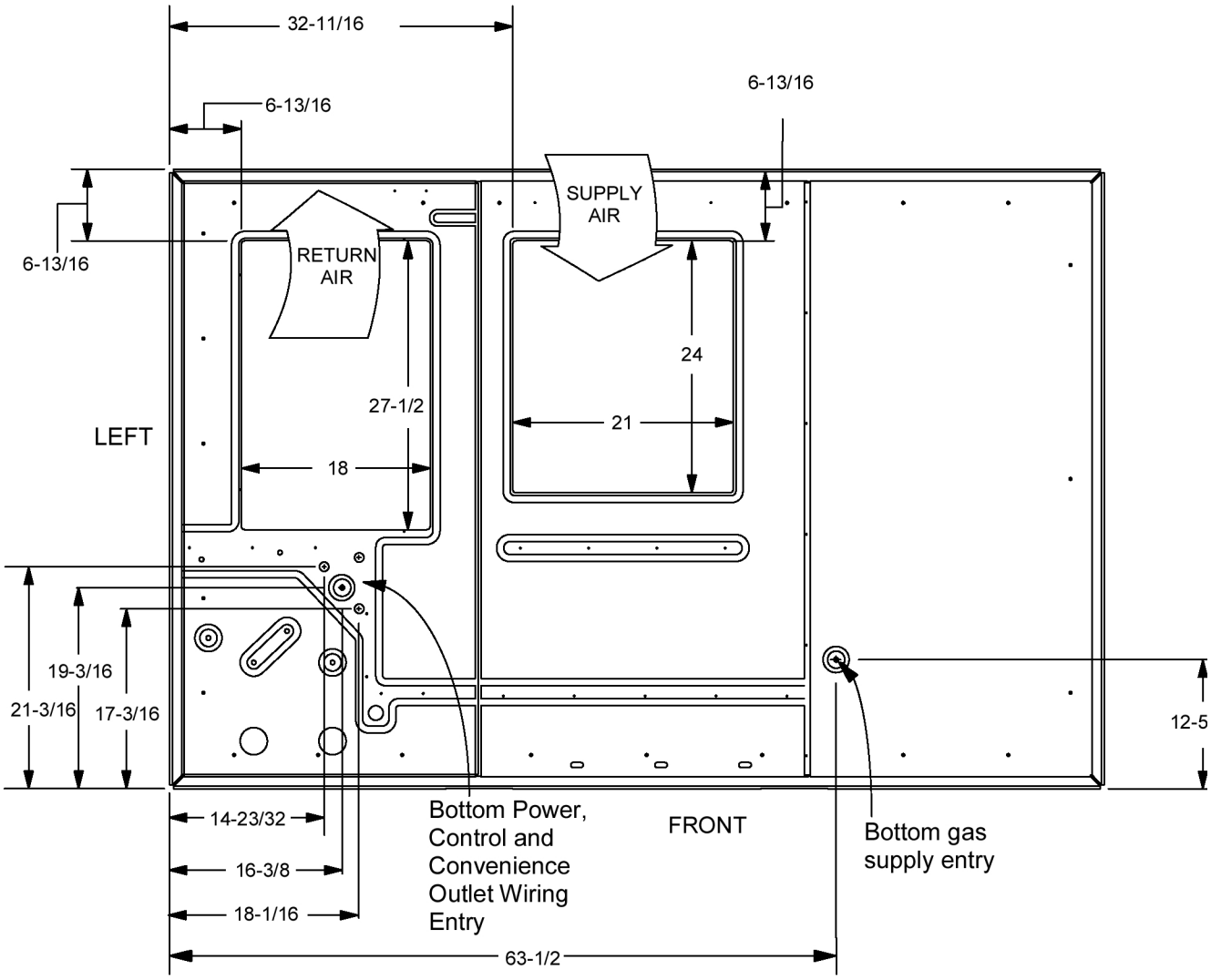


FIGURE 9 : BOTTOM DUCT OPENINGS (FROM ABOVE)

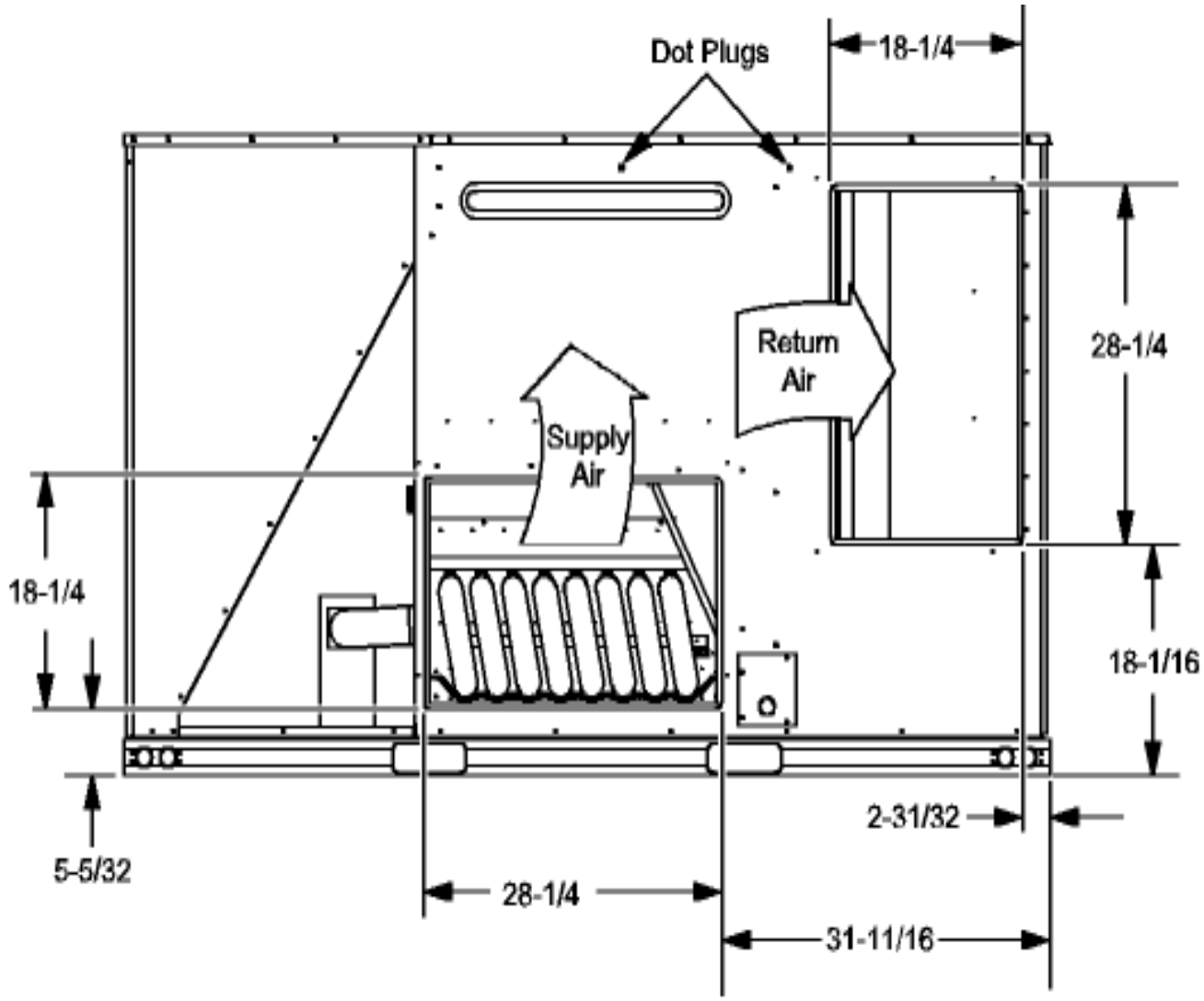


FIGURE 10 : REAR DUCT DIMENSIONS

DUCTWORK

Ductwork should be designed and sized according to the methods in Manual D of the Air Conditioning Contractors of America (ACCA) or as recommended by any other recognized authority such as ASHRAE or SMACNA.

A closed return duct system should be used. This will not preclude use of economizers or outdoor fresh air intake. The supply and return air duct connections at the unit should be made with flexible joints to minimize noise.

The supply and return air duct systems should be designed for the CFM and static pressure requirements of the job.

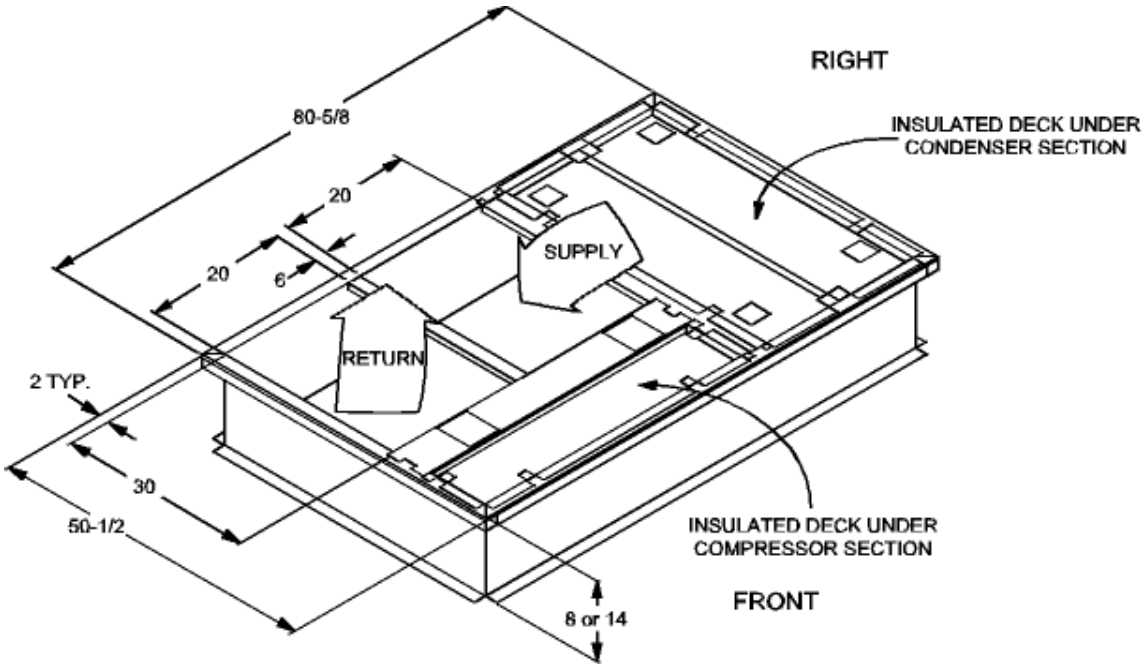


FIGURE 11 : PREDATOR™ ROOF CURB DIMENSIONS

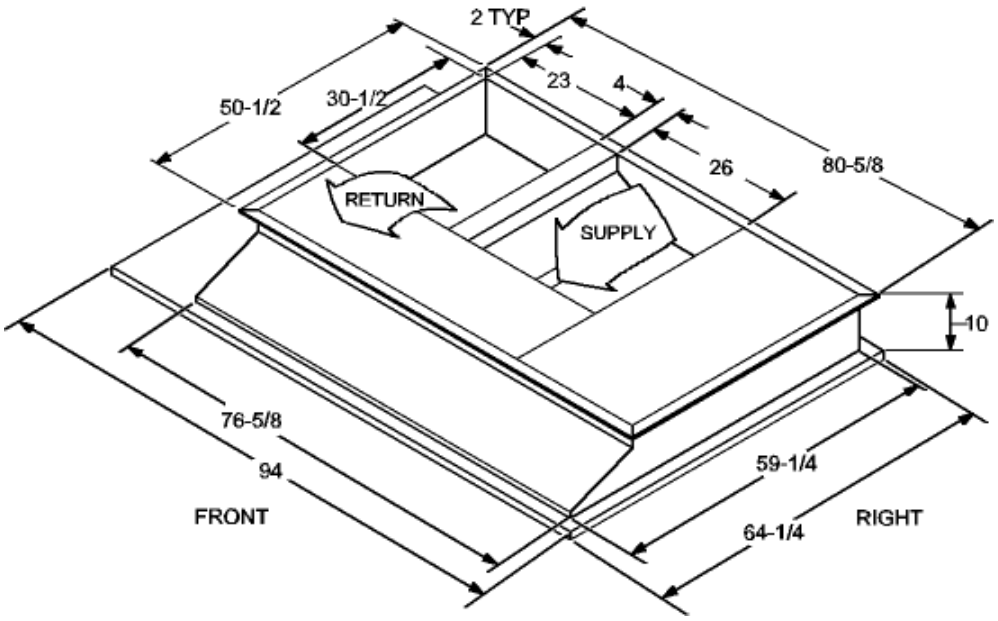


FIGURE 12 : SUNLINE™ TO PREDATOR™ TRANSITION ROOF CURBS

They should NOT be sized to match the dimensions of the duct connections on the unit.

Refer to Figure 9 for bottom air duct openings. Refer to Figure 10 for side air duct openings.

DUCT COVERS

Units are shipped with the side duct openings covered. For bottom duct application, no duct cover changes are necessary. For side duct application, remove the side duct covers and install over the bottom duct openings.

⚠ CAUTION

When fastening ductwork to side duct flanges on unit, insert screws through duct flanges only. DO NOT insert screws through casing. Outdoor ductwork must be insulated and water-proofed.

CONDENSATE DRAIN

The side condensate drain is reversible and maybe re-oriented to the rear of the cabinet to facilitate condensate piping. A condensate drain connection is available through the base pan for piping inside the roof curb. Trap the connection per Figure 13. The trap and drain lines should be protected from freezing.

Plumbing must conform to local codes. Use a sealing compound on male pipe threads. Install condensate drain line from the 3/4 inch NPT female connection on the unit to an open drain.

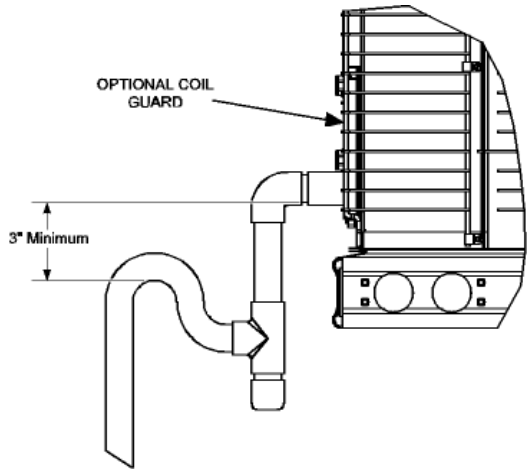


FIGURE 13 : CONDENSATE DRAIN

COMPRESSORS

The compressors are mounted on elastomer insulators. The mounting bolts have been fully tightened for shipping. Do not loosen the compressor mounting bolts.

FILTERS

Two-inch filters are supplied with each unit. One-inch filters may be used with no modification to the filter racks. Filters must always be installed ahead of evaporator coil and must be kept clean or replaced with same size and type. Dirty filters reduce the capacity of the unit and result in frosted coils or safety shutdown. All units use four (4) 20"x25"x2" filters. The unit should not be operated without filters properly

⚠ CAUTION

Make sure that panel latches are properly positioned on the unit to maintain an airtight seal.

THERMOSTAT WIRING

The thermostat should be located on an inside wall approximately 56 inch above the floor where it will not be subject to drafts, sun exposure or heat from electrical fixtures or appliances. Follow the manufacturer's instructions enclosed with thermostat for general installation procedure. Seven (7) color-coded, insulated wires should be used to connect the thermostat to the unit. Refer to Table 11 for control wire sizing and maximum length.

TABLE 11: CONTROL WIRE SIZES

Wire Size	Maximum Length*
18 AWG	150 Feet

*. From the unit to the thermostat and back to the unit.

POWER AND CONTROL WIRING

Field wiring to the unit, fuses, and disconnects must conform to provisions of National Electrical Code (NEC), ANSI/NFPA 70 – Latest Edition, and/or local ordinances. The unit must be electrically grounded in accordance with NEC ANSI/NFPA – Latest Edition and/or local codes. In Canada, the unit must conform to CSA C22.1.

Voltage tolerances which must be maintained at the compressor terminals during starting and running conditions are indicated on the unit Rating Plate and Table 5.

The internal wiring harnesses furnished with this unit are an integral part of the design certified unit. Field alteration to comply with electrical codes should not be required. If any of the wire supplied with the unit must be replaced, replacement wire must be of the type shown on the wiring diagram and the same minimum gauge as the replaced wire.

A disconnect must be utilized for these units. Factory installed disconnects are available. If installing a disconnect (field supplied or York International® supplied accessory), refer to Figure 4 for the recommended mounting location.

⚠ CAUTION

Avoid damage to internal components if drilling holes for disconnect mounting.

NOTE: Since not all local codes allow the mounting of a disconnect on the unit, please confirm compliance with local code before mounting a disconnect on the unit.

Electrical line must be sized properly to carry the load. USE COPPER CONDUCTORS ONLY. Each unit must be wired with a separate branch circuit fed directly from the meter panel and properly fused.

Refer to Figures 14, 15 and 16 for typical field wiring and to the appropriate unit wiring diagram mounted inside control doors for control circuit and power wiring information.

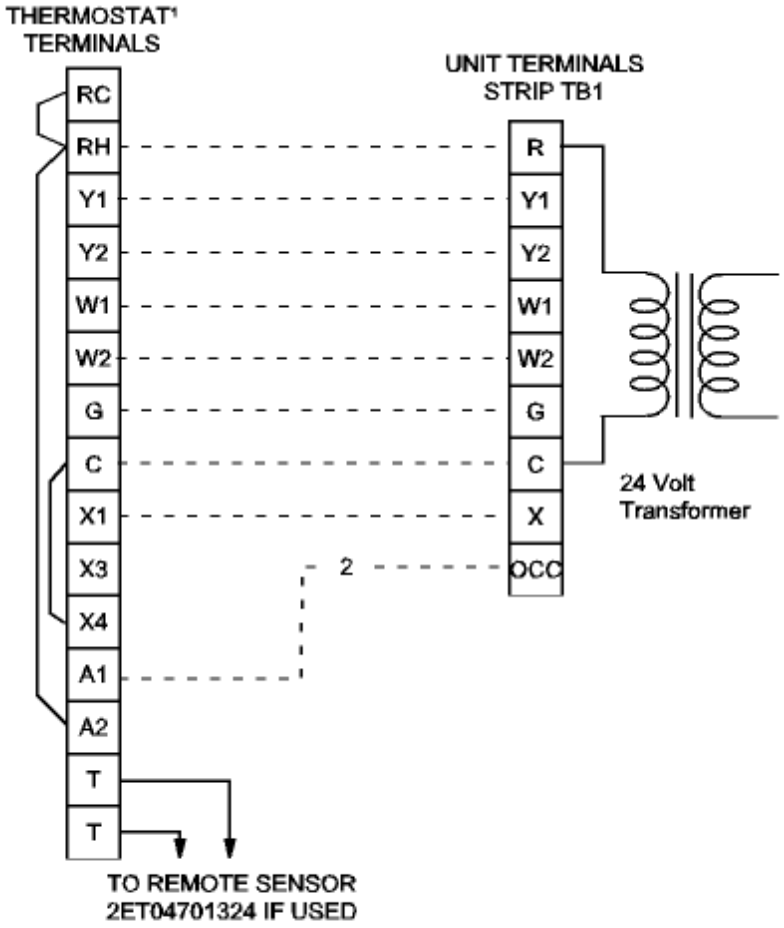
POWER WIRING DETAIL

⚠ CAUTION

When connecting electrical power and control wiring to the unit, water-proof connectors must be used so that water or moisture cannot be drawn into the unit during normal operation. The above water-proofing conditions will also apply when installing a field supplied disconnect switch.

Units are factory wired for the voltage shown on the unit nameplate. Refer to Electrical Data Tables 12 through 21 to size power wiring, fuses, and disconnect switch.

Power wiring is brought into the unit through the side of the unit or the basepan inside the curb.



[1] Electronic programmable Thermostat 2ET0770010024 (includes subbase).
[2] Terminals A1 and A2 provide a relay output to close the outdoor economizer dampers when the thermostat switches to the set-back position.

FIGURE 14 : ELECTRONIC THERMOSTAT FIELD WIRING

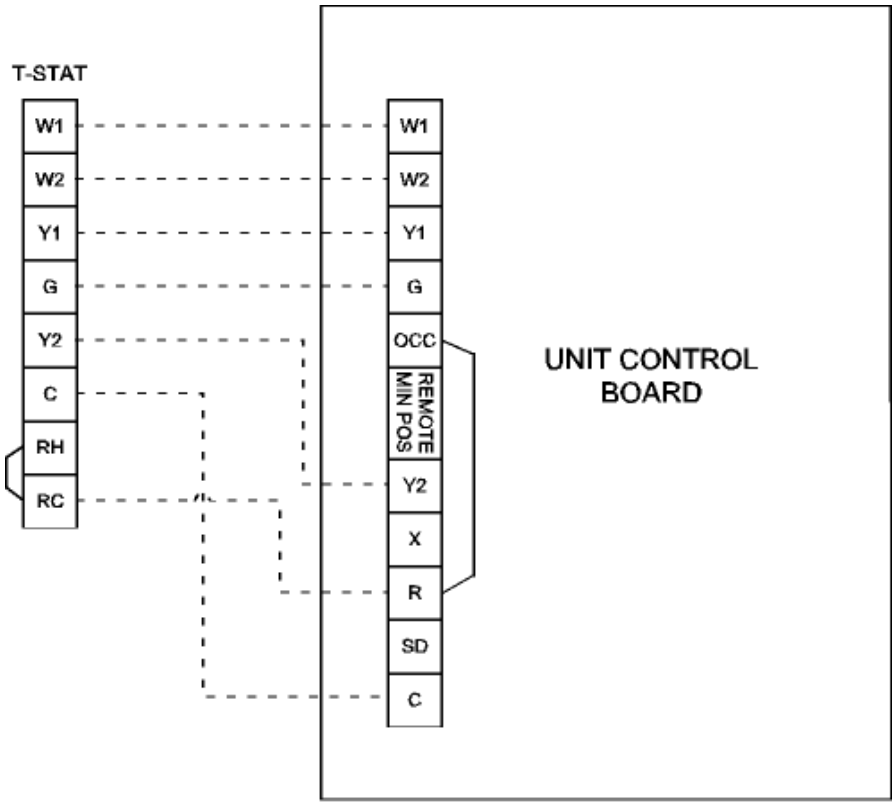


FIGURE 15 : FIELD WIRING 24 VOLT THERMOSTAT

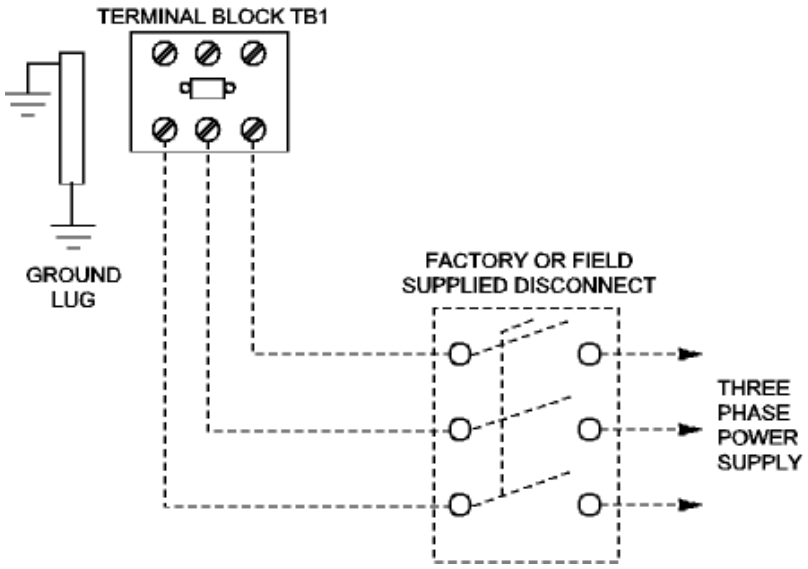


FIGURE 16 : FIELD WIRING DISCONNECT

TABLE 12: ELECTRICAL DATA 6-1/2 TON - STANDARD EFFICIENCY

Voltage	Compressors		OD Fan Motors FLA ea.	Blower Motor Supply FLA		Electric Heater			Min. Circuit Ampacity (Amps)		Max Fuse* Size (Amps)	
	RLA ea.	LRA ea.		1.5 HP	2 HP	Model Numbers	Rated kW	Heater Amps	1.5 HP	2 HP	1.5 HP	2 HP
208	14.1	110	1.5	6.2	8.2	None	-	-	40.9	42.9	50	50
						2TP04510925	6.8	18.7	40.9	42.9	50	50
						2TP04511825	13.5	37.5	54.6	57.1	60	60
						2TP04512425	18.0	50.0	70.2	72.7	80	80
						2TP04513625	27.0	70.8	96.2	98.7	100	100
230	14.1	110	1.5	6.2	8.2	None	-	-	40.9	42.9	50	50
						2TP04510925	9.0	21.7	40.9	42.9	50	50
						2TP04511825	18.0	43.3	61.9	64.4	70	70
						2TP04512425	24.0	57.7	79.9	82.4	80	90
						2TP04513625	34.0	81.8	110.0	112.5	110	125
460	7.1	54	0.8	3.1	4.1	None	-	-	20.7	21.7	25	25
						2TP04510946	9.0	10.8	20.7	21.7	25	25
						2TP04511846	18.0	21.7	30.9	32.2	35	35
						2TP04512446	24.0	28.9	40.0	41.2	40	45
						2TP04513646	34.0	40.9	55.0	56.2	60	60
575	5.8	44	0.6	2.4	3.6	None	-	-	16.7	17.9	20	20
						2TP04510958	9.0	8.7	16.7	17.9	20	20
						2TP04511858	18.0	17.3	24.7	26.2	25	30
						2TP04512458	24.0	23.1	31.9	33.4	35	35
						2TP04513658	34.0	32.7	43.9	45.4	45	50

*. Maximum HACR breaker of the same AMP size is applicable.

TABLE 13: ELECTRICAL DATA 6-1/2 TON - HIGH EFFICIENCY

Voltage	Compressors		OD Fan Motors FLA ea.	Blower Motor Supply FLA		Electric Heater			Min. Circuit Ampacity (Amps)		Max Fuse* Size (Amps)	
	RLA ea.	LRA ea.		1.5 HP	2 HP	Model Numbers	Rated kW	Heater Amps	1.5 HP	2 HP	1.5 HP	2 HP
208	14.1	110	1.5	6.2	8.2	None	-	-	40.9	42.9	50	50
						2TP04510925	6.8	18.7	40.9	42.9	50	50
						2TP04511825	13.5	37.5	54.6	57.1	60	60
						2TP04512425	18.0	50.0	70.2	72.7	80	80
						2TP04513625	27.0	70.8	96.2	98.7	100	100
230	14.1	110	1.5	6.2	8.2	None	-	-	40.9	42.9	50	50
						2TP04510925	9.0	21.7	40.9	42.9	50	50
						2TP04511825	18.0	43.3	61.9	64.4	70	70
						2TP04512425	24.0	57.7	79.9	82.4	80	90
						2TP04513625	34.0	81.8	110.0	112.5	110	125
460	6.4	54	0.8	3.1	4.1	None	-	-	19.1	20.1	25	25
						2TP04510946	9.0	10.8	19.1	20.1	25	25
						2TP04511846	18.0	21.7	30.9	32.2	35	35
						2TP04512446	24.0	28.9	40.0	41.2	40	45
						2TP04513646	34.0	40.9	55.0	56.2	60	60
575	5.8	44	0.6	2.4	3.6	None	-	-	16.7	17.9	20	20
						2TP04510958	9.0	8.7	16.7	17.9	20	20
						2TP04511858	18.0	17.3	24.7	26.2	25	30
						2TP04512458	24.0	23.1	31.9	33.4	35	35
						2TP04513658	34.0	32.7	43.9	45.4	45	50

*. Maximum HACR breaker of the same AMP size is applicable.

TABLE 14: ELECTRICAL DATA 7-1/2 TON - STANDARD EFFICIENCY

Voltage	Compressors		OD Fan Motors FLA ea.	Blower Motor Supply FLA		Electric Heater			Min. Circuit Ampacity (Amps)		Max Fuse* Size (Amps)	
	RLA ea.	LRA ea.		1.5 HP	2 HP	Model Numbers	Rated kW	Heater Amps	1.5 HP	2 HP	1.5 HP	2 HP
208	14.1	110	1.5	6.2	8.2	None	-	-	40.9	42.9	50	50
						2TP04510925	6.8	18.7	40.9	42.9	50	50
						2TP04511825	13.5	37.5	54.6	57.1	60	60
						2TP04512425	18.0	50.0	70.2	72.7	80	80
						2TP04513625	27.0	70.8	96.2	98.7	100	100
230	14.1	110	1.5	6.2	8.2	None	-	-	40.9	42.9	50	50
						2TP04510925	9.0	21.7	40.9	42.9	50	50
						2TP04511825	18.0	43.3	61.9	64.4	70	70
						2TP04512425	24.0	57.7	79.9	82.4	80	90
						2TP04513625	34.0	81.8	110.0	112.5	110	125
460	7.1	64	0.8	3.1	4.1	None	-	-	20.7	21.7	25	25
						2TP04510946	9.0	10.8	20.7	21.7	25	25
						2TP04511846	18.0	21.7	30.9	32.2	35	35
						2TP04512446	24.0	28.9	40.0	41.2	40	45
						2TP04513646	34.0	40.9	55.0	56.2	60	60
575	5.8	44	0.6	2.4	3.6	None	-	-	16.7	17.9	20	20
						2TP04510958	9.0	8.7	16.7	17.9	20	20
						2TP04511858	18.0	17.3	24.7	26.2	25	30
						2TP04512458	24.0	23.1	31.9	33.4	35	35
						2TP04513658	34.0	32.7	43.9	45.4	45	50

*. Maximum HACR breaker of the same AMP size is applicable.

TABLE 15: ELECTRICAL DATA 7-1/2 TON - HIGH EFFICIENCY

Voltage	Compressors		OD Fan Motors FLA ea.	Blower Motor Supply FLA		Electric Heater			Min. Circuit Ampacity (Amps)		Max Fuse* Size (Amps)	
	RLA ea.	LRA ea.		1.5 HP	2 HP	Model Numbers	Rated kW	Heater Amps	1.5 HP	2 HP	1.5 HP	2 HP
208	14.1	110	1.5	6.2	8.2	None	-	-	40.9	42.9	50	50
						2TP04510925	6.8	18.7	40.9	42.9	50	50
						2TP04511825	13.5	37.5	54.6	57.1	60	60
						2TP04512425	18.0	50.0	70.2	72.7	80	80
						2TP04513625	27.0	70.8	96.2	98.7	100	100
230	14.1	110	1.5	6.2	8.2	None	-	-	40.9	42.9	50	50
						2TP04510925	9.0	21.7	40.9	42.9	50	50
						2TP04511825	18.0	43.3	61.9	64.4	70	70
						2TP04512425	24.0	57.7	79.9	82.4	80	90
						2TP04513625	34.0	81.8	110.0	112.5	110	125
460	7.1	54	0.8	3.1	4.1	None	-	-	20.7	21.7	25	25
						2TP04510946	9.0	10.8	20.7	21.7	25	25
						2TP04511846	18.0	21.7	30.9	32.2	35	35
						2TP04512446	24.0	28.9	40.0	41.2	40	45
						2TP04513646	34.0	40.9	55.0	56.2	60	60
575	5.8	44	0.6	2.4	3.6	None	-	-	16.7	17.9	20	20
						2TP04510958	9.0	8.7	16.7	17.9	20	20
						2TP04511858	18.0	17.3	24.7	26.2	25	30
						2TP04512458	24.0	23.1	31.9	33.4	35	35
						2TP04513658	34.0	32.7	43.9	45.4	45	50

*. Maximum HACR breaker of the same AMP size is applicable.

TABLE 16: ELECTRICAL DATA 8-1/2 TON - STANDARD EFFICIENCY

Voltage	Compressors		OD Fan Motors FLA ea.	Blower Motor Supply FLA		Electric Heater			Min. Circuit Ampacity (Amps)		Max Fuse* Size (Amps)	
	RLA ea.	LRA ea.		2 HP	3 HP	Model Numbers	Rated kW	Heater Amps	2 HP	3 HP	2 HP	3 HP
208	16.0	137	3.5	8.2	10.9	None	-	-	51.2	53.9	60	60
						2TP04510925	6.8	18.7	51.2	53.9	60	60
						2TP04511825	13.5	37.5	57.1	60.5	60	70
						2TP04512425	18.0	50.0	72.7	76.1	80	80
						2TP04513625	27.0	70.8	98.7	102.1	100	110
230	16.0	137	3.5	8.2	10.9	None	-	-	51.2	53.9	60	60
						2TP04510925	9.0	21.7	51.2	53.9	60	60
						2TP04511825	18.0	43.3	64.4	67.8	70	70
						2TP04512425	24.0	57.7	82.4	85.8	90	90
						2TP04513625	34.0	81.8	112.5	115.9	125	125
460	8.3	69	1.6	4.1	5.3	None	-	-	26.0	27.2	30	35
						2TP04510946	9.0	10.8	26.0	27.2	30	35
						2TP04511846	18.0	21.7	32.2	33.7	35	35
						2TP04512446	24.0	28.9	41.2	42.7	45	45
						2TP04513646	34.0	40.9	56.2	57.7	60	60
575	6.4	58	1.3	3.6	4.1	None	-	-	20.6	21.1	25	25
						2TP04510958	9.0	8.7	20.6	21.1	25	25
						2TP04511858	18.0	17.3	26.2	26.8	30	30
						2TP04512458	24.0	23.1	33.4	34.0	35	35
						2TP04513658	34.0	32.7	45.4	46.0	50	50

*. Maximum HACR breaker of the same AMP size is applicable.

TABLE 17: ELECTRICAL DATA 8-1/2 TON - HIGH EFFICIENCY

Voltage	Compressors		OD Fan Motors FLA ea.	Blower Motor Supply FLA		Electric Heater			Min. Circuit Ampacity (Amps)		Max Fuse* Size (Amps)	
	RLA ea.	LRA ea.		2 HP	3 HP	Model Numbers	Rated kW	Heater Amps	2 HP	3 HP	2 HP	3 HP
208	14.1	130	1.5	8.2	10.9	None	-	-	42.9	45.6	50	50
						2TP04510925	6.8	18.7	42.9	45.6	50	50
						2TP04511825	13.5	37.5	57.1	60.5	60	70
						2TP04512425	18.0	50.0	72.7	76.1	80	80
						2TP04513625	25.5	70.8	98.7	102.1	100	110
230	14.1	130	1.5	8.2	10.9	None	-	-	42.9	45.6	50	50
						2TP04510925	9.0	21.7	42.9	45.6	50	50
						2TP04511825	18.0	43.3	64.4	67.8	70	70
						2TP04512425	24.0	57.7	82.4	85.8	90	90
						2TP04513625	34.0	81.8	112.5	115.9	125	125
460	7.1	64	0.8	4.1	5.3	None	-	-	21.7	22.9	25	25
						2TP04510946	9.0	10.8	21.7	22.9	25	25
						2TP04511846	18.0	21.7	32.2	33.7	35	35
						2TP04512446	24.0	28.9	41.2	42.7	45	45
						2TP04513646	34.0	40.9	56.2	57.7	60	60
575	5.8	52	0.6	3.6	4.1	None	-	-	17.9	18.4	20	20
						2TP04510958	9.0	8.7	17.9	18.4	20	20
						2TP04511858	18.0	17.3	26.2	26.8	30	30
						2TP04512458	24.0	23.1	33.4	34.0	35	35
						2TP04513658	34.0	32.7	45.4	46.0	50	50

*. Maximum HACR breaker of the same AMP size is applicable.

TABLE 18: ELECTRICAL DATA 10 TON - STANDARD EFFICIENCY

Voltage	Compressors		OD Fan Motors FLA ea.	Blower Motor Supply FLA		Electric Heater			Min. Circuit Ampacity (Amps)		Max Fuse* Size (Amps)	
	RLA ea.	LRA ea.		2 HP	3 HP	Model Numbers	Rated kW	Heater Amps	2 HP	3 HP	2 HP	3 HP
208	16.8	150	3.5	8.2	10.9	None	-	-	53.0	55.7	60	70
						2TP04511825	13.5	37.5	57.1	60.5	60	70
						2TP04512425	18.0	50.0	72.7	76.1	80	80
						2TP04513625	27.0	70.8	98.7	102.1	100	110
						2TP04515425	40.5	112.4	150.8	154.1	175	175
230	16.8	150	3.5	8.2	10.9	None	-	-	53.0	55.7	60	70
						2TP04511825	18.0	43.3	64.4	67.8	70	70
						2TP04512425	24.0	57.7	82.4	85.8	90	90
						2TP04513625	34.0	81.8	112.5	115.9	125	125
						2TP04515425	54.0	129.9	140.2	143.5	150	150
460	9.0	75	1.6	4.1	5.3	None	-	-	27.6	28.8	35	35
						2TP04511846	18.0	21.7	32.2	33.7	35	35
						2TP04512446	24.0	28.9	41.2	42.7	45	45
						2TP04513646	34.0	40.9	56.2	57.7	60	60
						2TP04515446	54.0	65.0	70.1	71.6	80	80
575	7.1	62	1.3	3.6	4.1	None	-	-	22.2	22.7	25	25
						2TP04511858	18.0	17.3	26.2	26.8	30	30
						2TP04512458	24.0	23.1	33.4	34.0	35	35
						2TP04513658	34.0	32.7	45.4	46.0	50	50
						2TP04515458	54.0	52.0	56.5	57.1	60	60

*. Maximum HACR breaker of the same AMP size is applicable.

TABLE 19: ELECTRICAL DATA 10 TON - HIGH EFFICIENCY

Voltage	Compressors		OD Fan Motors FLA ea.	Blower Motor Supply FLA		Electric Heater			Min. Circuit Ampacity (Amps)		Max Fuse* Size (Amps)	
	RLA ea.	LRA ea.		2 HP	3 HP	Model Numbers	Rated kW	Heater Amps	2 HP	3 HP	2 HP	3 HP
208	16.0	167	3.5	8.2	10.9	None	-	-	51.2	53.9	60	60
						2TP04511825	13.5	37.5	57.1	60.5	60	70
						2TP04512425	18.0	50.0	72.7	76.1	80	80
						2TP04513625	27.0	70.8	98.7	102.1	100	110
						2TP04515425	40.5	112.4	150.8	154.1	175	175
230	16.0	167	3.5	8.2	10.9	None	-	-	51.2	53.9	60	60
						2TP04511825	18.0	43.3	64.4	67.8	70	70
						2TP04512425	24.0	57.7	82.4	85.8	90	90
						2TP04513625	34.0	81.8	112.5	115.9	125	125
						2TP04515425	54.0	129.9	140.2	143.5	150	150
460	8.3	69	1.6	4.1	5.3	None	-	-	26.0	27.2	30	35
						2TP04511846	18.0	21.7	32.2	33.7	35	35
						2TP04512446	24.0	28.9	41.2	42.7	45	45
						2TP04513646	34.0	40.9	56.2	57.7	60	60
						2TP04515446	54.0	65.0	70.1	71.6	80	80
575	6.4	58	1.3	3.6	4.1	None	-	-	20.6	21.1	25	25
						2TP04511858	18.0	17.3	26.2	26.8	30	30
						2TP04512458	24.0	23.1	33.4	34.0	35	35
						2TP04513658	34.0	32.7	45.4	46.0	50	50
						2TP04515458	54.0	52.0	56.5	57.1	60	60

*. Maximum HACR breaker of the same AMP size is applicable.

TABLE 20: ELECTRICAL DATA 12-1/2 TON - STANDARD EFFICIENCY

Voltage	Compressors		OD Fan Motors FLA ea.	Blower Motor Supply FLA		Electric Heater			Min. Circuit Ampacity (Amps)		Max Fuse* Size (Amps)	
	RLA ea.	LRA ea.		3 HP	5 HP	Model Numbers	Rated kW	Heater Amps	3 HP	5 HP	3 HP	5 HP
208	21.8	158	3.5	10.9	17.3	None	-	-	67.0	73.4	80	90
						2TP04511825	13.5	37.5	67.0	73.4	80	90
						2TP04512425	18.0	50.0	76.1	84.1	80	90
						2TP04513625	27.0	70.8	102.1	110.1	110	125
						2TP04515425	40.5	112.4	154.1	162.1	175	175
230	21.8	158	3.5	10.9	17.3	None	-	-	67.0	73.4	80	90
						2TP04511825	18.0	43.3	67.8	75.8	80	90
						2TP04512425	24.0	57.7	85.8	93.8	90	100
						2TP04513625	34.0	81.8	115.9	123.9	125	125
						2TP04515425	54.0	129.9	143.5	151.5	150	175
460	9.6	79	1.6	5.3	8.6	None	-	-	30.1	33.4	35	40
						2TP04511846	18.0	21.7	33.7	37.8	35	40
						2TP04512446	24.0	28.9	42.7	46.8	45	50
						2TP04513646	34.0	40.9	57.7	61.9	60	70
						2TP04515446	54.0	65.0	71.6	75.7	80	80
575	9.0	65	1.3	4.1	6.8	None	-	-	27.0	29.7	35	35
						2TP04511858	18.0	17.3	27.0	30.2	35	35
						2TP04512458	24.0	23.1	34.0	37.4	35	40
						2TP04513658	34.0	32.7	46.0	49.4	50	50
						2TP04515458	54.0	52.0	57.1	60.5	60	70

*. Maximum HACR breaker of the same AMP size is applicable.

TABLE 21: ELECTRICAL DATA 12-1/2 TON - HIGH EFFICIENCY

Voltage	Compressors		OD Fan Motors FLA ea.	Blower Motor Supply FLA		Electric Heater			Min. Circuit Ampacity (Amps)		Max Fuse* Size (Amps)	
	RLA ea.	LRA ea.		3 HP	5 HP	Model Numbers	Rated kW	Heater Amps	3 HP	5 HP	3 HP	5 HP
208	18.9	146	3.5	10.9	17.3	None	-	-	60.4	66.8	70	80
						2TP04511825	13.5	37.5	60.5	68.5	70	80
						2TP04512425	18.0	50.0	76.1	84.1	80	90
						2TP04513625	27.0	70.8	102.1	110.1	110	125
						2TP04515425	40.5	112.4	154.1	162.1	175	175
230	18.9	146	3.5	10.9	17.3	None	-	-	60.4	66.8	70	80
						2TP04511825	18.0	43.3	67.8	75.8	70	80
						2TP04512425	24.0	57.7	85.8	93.8	90	100
						2TP04513625	34.0	81.8	115.9	123.9	125	125
						2TP04515425	54.0	129.9	143.5	151.5	150	175
460	9.5	73	1.6	5.3	8.6	None	-	-	29.9	33.2	35	40
						2TP04511846	18.0	21.7	33.7	37.8	35	40
						2TP04512446	24.0	28.9	42.7	46.8	45	50
						2TP04513646	34.0	40.9	57.7	61.9	60	70
						2TP04515446	54.0	65.0	71.6	75.7	80	80
575	7.6	58	1.3	4.1	6.8	None	-	-	23.8	26.5	30	30
						2TP04511858	18.0	17.3	26.8	30.2	30	35
						2TP04512458	24.0	23.1	34.0	37.4	35	40
						2TP04513658	34.0	32.7	46.0	49.4	50	50
						2TP04515458	54.0	52.0	57.1	60.5	60	70

*. Maximum HACR breaker of the same AMP size is applicable.

TABLE 22: PHYSICAL DATA

Component			Models				
			078	090	102	120	150
Evaporator Blower	Blower, Centrifugal (Dia. X Wd. in.)		15 x 15	15 x 15	15 x 15	15 x 15	15 x 15
	Motor, Standard (HP)		1-1/2	1-1/2	2	2	3
	Motor, Optional (HP)		2	2	3	3	5
Evaporator Coil	DM	Rows	2	2	3	2	3
		Fins per Inch	15	15	15	15	15
		Height (in.)	30	32	24	40	40
		Face Area ($ft.^2$ each)	9.9	10.6	7.9	13.2	13.2
	DH	Rows	3	3	3	4	4
		Fins per Inch	15	15	15	15	15
		Height (in.)	32	32	40	40	40
		Face Area ($ft.^2$ each)	10.6	10.6	13.2	13.2	13.2

TABLE 22: PHYSICAL DATA (CONTINUED)

Component			Models				
			078	090	102	120	150
Condenser Fan (2 per Unit)	DM	Propeller Dia. (in., each)	24	24	24	24	24
		Motor (HP, each)	1/3	1/3	3/4	3/4	3/4
		CFM, Nominal (each)	3400	3400	4400	4400	4400
	DH	Propeller Dia. (in., each)	24	24	24	24	24
		Motor (HP, each)	1/3	1/3	1/3	3/4	3/4
		CFM, Nominal (each)	3400	3400	3400	4400	4400
Condenser Coil (2 per unit)	DM	Rows (each)	1	1	1	1	2
		Fins per Inch	20	20	20	20	20
		Height (in. each)	24	28	36	44	44
		Face Area ($ft.^2$ each)	7.9	9.2	11.9	14.5	14.5
	DH	Rows (each)	1	1	2	2	2
		Fins per Inch	20	20	20	20	20
		Height (in., each)	44	44	44	44	44
		Face Area ($ft.^2$ each)	14.5	14.5	14.5	14.5	14.5
Refrigerant Charge	DM	System 1 (lb./oz.)	4/6	4/12	5/0	6/12	10/12
		System 2 (lb./oz.)	4/0	4/6	5/4	6/12	9/8
	DH	System 1 (lb./oz.)	6/4	6/14	10/0	12/0	9/14
		System 2 (lb./oz.)	5/12	6/8	9/8	11/0	9/4
Compressors	DM	Quantity	2	2	2	2	2
		Type	Recip	Recip	Recip	Recip	Recip
	DH	Quantity	2	2	2	2	2
		Type	Recip	Recip	Recip	Recip	Scroll
Air Filters	Size (Wd. x Ht. x Thickness in.)		25x20x2	25x20x2	25x20x2	25x20x2	25x20x2
	Number Per Unit		4	4	4	4	4

GAS HEAT

LP UNITS, TANKS AND PIPING

All gas heat units are shipped from the factory equipped for natural gas use only. The unit may be converted in the field for use with LP gas with accessory kit model number 1NP0441.

All LP gas equipment must conform to the safety standards of the National Fire Protection Association.

For satisfactory operation, LP gas pressure must be 10.5 inch W.C. at the unit under full load. Maintaining proper gas pressure depends on three main factors:

1. The vaporization rate which depends on the temperature of the liquid and the “wetted surface” area of the container(s).
2. The proper pressure regulation. (Two-stage regulation is recommended).
3. The pressure drop in the lines between regulators and between the second stage regulator and the appliance. Pipe size required will depend on the length of the pipe run and the total load of all appliances.

Complete information regarding tank sizing for vaporization, recommended regulator settings, and pipe sizing is available from most regulator manufacturers and LP gas suppliers.

LP gas is an excellent solvent and will quickly dissolve white lead and most standard commercial compounds. A special pipe dope must be used when assembling wrought iron or steel pipe for LP. Shellac base compounds such as Gaskolac or Stalastic, and compounds such as Rectorseal #5, Clyde’s, or John Crane may be used.

GAS PIPING

Proper sizing of gas piping depends on the cubic feet per hour of gas flow required, specific gravity of the gas, and the length of run. National Fuel Gas Code, ANSI Z223.1 - Latest Edition should be followed in all cases unless superseded by local codes or gas company requirements. Refer to Table 24. The heating value of the gas may differ with locality. The value should be checked with the local gas utility. In Canada please refer to the Natural Gas and Propane Installation Code CSA - B149.

TABLE 23: GAS HEAT LIMIT SETTINGS*

# of HX Tubes	Main Limit Setting
4	215°F
6	195°F
8	160°F

*. Rollout = 300°F, Auxiliary Limit = 200°F

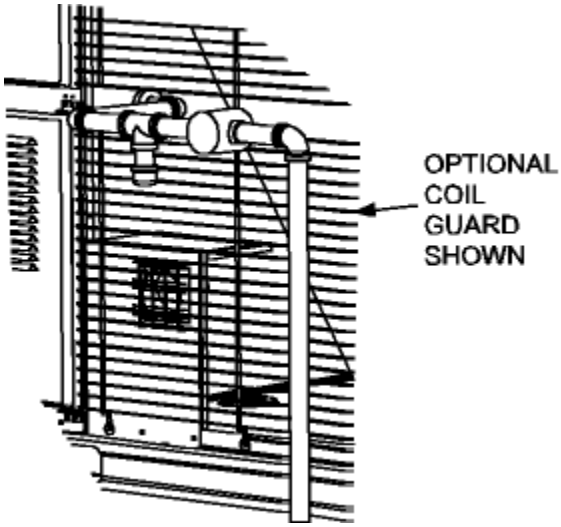


FIGURE 17 : SIDE ENTRY GAS PIPING

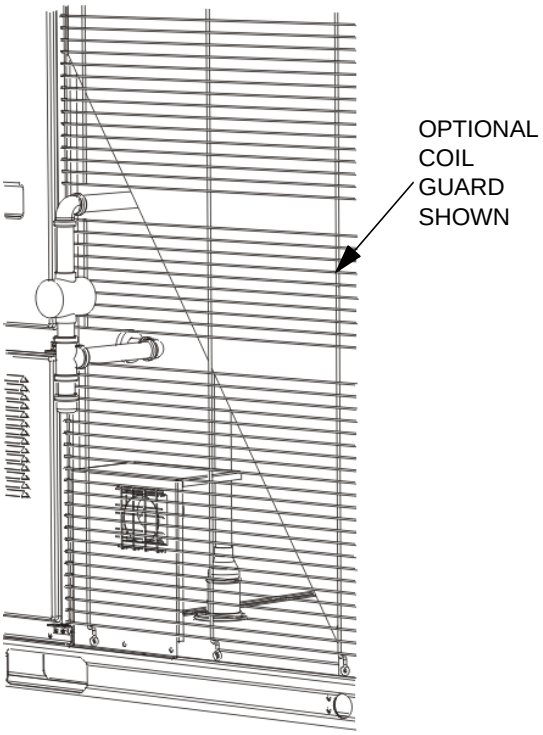


FIGURE 18 : BOTTOM ENTRY GAS PIPING

TABLE 24: GAS PIPE SIZING - CAPACITY OF PIPE

Length of Pipe (ft.)	Nominal Iron Pipe Size		
	3/4 in.	1 in.	1-1/4 in.
10	278	520	1050
20	190	350	730
30	152	285	590
40	130	245	500
50	115	215	440
60	105	195	400
70	96	180	370
80	90	170	350
90	84	160	320
100	79	150	305

NOTE: Maximum capacity of pipe in cubic feet of gas per hour based upon a pressure drop of 0.3 inch W.C. and 0.6 specific gravity gas.

NOTE: There may be a local gas utility requirement specifying a minimum diameter for gas piping. All units require a 3/4 inch pipe connection at the entrance fitting. Line should not be sized smaller than the entrance fitting size.

GAS CONNECTION

The gas supply line can be routed within the space and roof curb, exiting through the unit's basepan. Refer to Figure 9 for the gas piping inlet location. Typical supply piping arrangements are shown in Figures 17 and 18. All pipe nipples, fittings, and the gas cock are field supplied or may be purchased in UPG accessory kit #1GP0404.

Gas piping recommendations:

1. A drip leg and a ground joint union must be installed in the gas piping.
2. Where required by local codes, a manual shut-off valve must be installed outside of the unit.
3. Use wrought iron or steel pipe for all gas lines. Pipe dope should be applied sparingly to male threads only.

⚠ WARNING

Natural gas may contain some propane. Propane is an excellent solvent and will quickly dissolve white lead and most standard commercial compounds. A special pipe dope must be used when assembling wrought iron or steel pipe. Shellac based compounds such as Gaskolac or Stalastic, and compounds such as Rectorseal #5, Clydes's or John Crane may be used.

4. All piping should be cleaned of dirt and scale by hammering on the outside of the pipe and blowing out loose particles. Before initial start-up, be sure that all gas lines external to the unit have been purged of air.
5. The gas supply should be a separate line and installed in accordance with all safety codes as prescribed under "Limitations".
6. A 1/8-inch NPT plugged tapping, accessible for test gage connection, must be installed immediately upstream of the gas supply connection to the unit.
7. After the gas connections have been completed, open the main shut-off valve admitting *normal gas pressure* to the mains. *Check all joints for leaks with soap solution or other material suitable for the purpose.* NEVER USE A FLAME.

⚠ CAUTION

The furnace and its individual shut-off valve must be disconnected from the gas supply piping system during any pressure testing at pressures in excess of 1/2 PSIG.

Pressures greater than 1/2 PSIG will cause gas valve damage resulting in a hazardous condition. If it is subjected to a pressure greater than 1/2 PSIG, the gas valve must be replace.

The furnace must be isolated from the gas supply piping system by closing its individual manual shut-off valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 PSIG.

VENT AND COMBUSTION AIR

Venting slots in the heating compartment access panel remove the need for a combustion air hood. The gas heat flue exhaust is routed through factory installed exhaust piping with screen. If necessary, a flue exhaust extension may be installed at the point of installation.

ACCESSORIES

ELECTRIC HEAT

Electric heaters are available for field installation. Refer to electric heat instructions for installation. These heaters mount in the heat compartment with the heating elements extending into the supply air chamber. All electric heaters are fused and intended for use with single point power supply.

ECONOMIZER

The economizer can be factory or field installed. If factory installed, refer to the instructions included with the outdoor air hood to complete the assembly. Field installed economizers include complete instructions for installation.

RAIN HOOD

The following procedure should be used when assembling the economizer rain hood onto a unit. The outdoor and return air dampers, the damper actuator and gears, the outdoor and return air divider baffles, and all chosen control sensors are factory mounted as part of the economizer option.

All of the hood components, including the filters, the gasketing, and the hardware for assembling, are packaged and located between the condenser coil section and the main unit cabinet.

To assemble the rain hood:

1. Remove the hood components, filters, gasketing, and assembly hardware from the area between the coils and main cabinet.
2. Follow the instructions included with the hood to complete the installation.

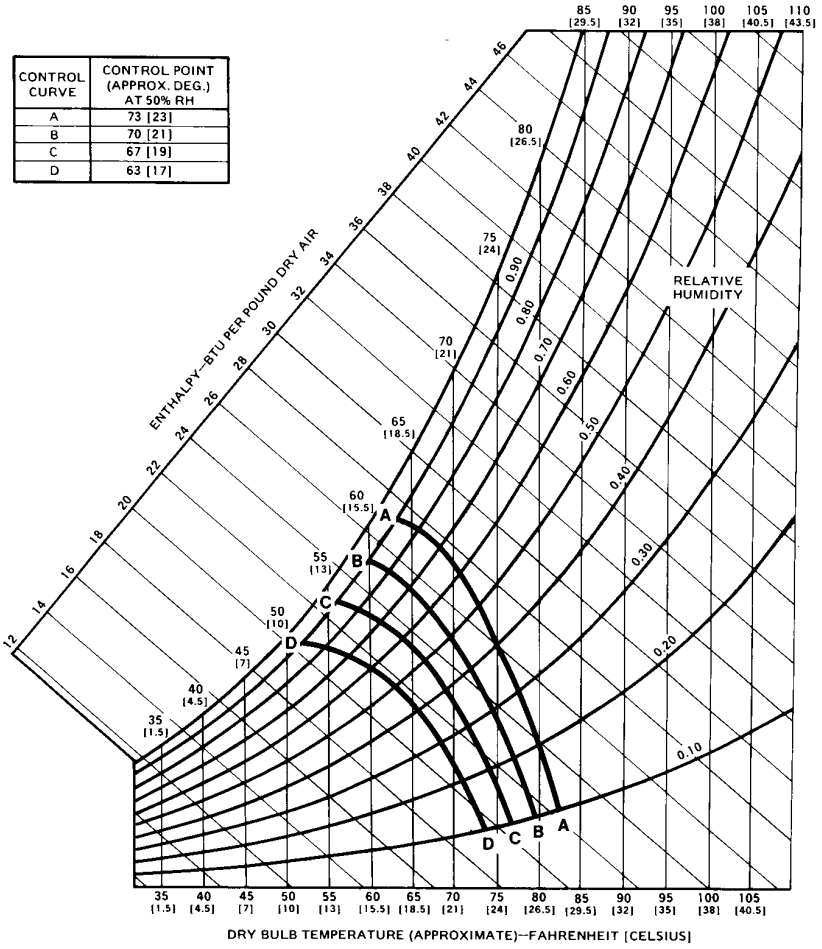


FIGURE 19 : ENTHALPY SET POINT CHART

SET POINT ADJUSTMENT

1. The enthalpy set point for the dampers may now be set by selecting the desired setpoint. Adjust as follows:
   - For a single enthalpy carefully turn the set point adjusting screw to the “A”, “B”, “C” or “D” setting corresponding to the lettered curve.
   - For a dual enthalpy carefully turn the set point adjusting screw fully clockwise past the “D” setting.

⚠ CAUTION

Extreme care must be exercised in turning both the setpoint and minimum position adjusting screws to prevent twisting them off.

2. To check that the damper blades move smoothly without binding carefully turn the minimum position adjusting screw fully clockwise and then energize and de-energize terminals “R to “G”. With terminals “R” to “G” energized, turn the minimum position screw counterclockwise until the desired minimum position has been attained.

TABLE 25: ACCESSORY STATIC RESISTANCE*

Description	External Static Pressure Drop - Resistance, IWG				
	CFM				
	2250	3000	4000	5000	6000
Economizer	0.03	0.03	0.04	0.07	0.09

*. Deduct these resistance values from the available external static pressure shown in the respective Blower Performance Table.

START-UP

PHASING

Predator™ units are properly phased at the factory. Check for proper compressor rotation. If the blower or compressors rotate in the wrong direction at start-up, the electrical connection to the unit is misphased. Change the incoming line connection phasing to obtain proper rotation. (Scroll compressors operate in only one direction. If the scroll is drawing low amperage, has similar suction and discharge pressures, or producing a high noise level, the scroll is misphased).

⚠ CAUTION

Scroll compressors require proper rotation to operate correctly. Units are properly phased at the factory. Do not change the internal wiring to make the blower condenser fans, or compressor rotate correctly.

SUPPLY AIR INSTRUCTIONS

CHECKING SUPPLY AIR CFM

The RPM of the supply air blower will depend on the required CFM, the static pressure resistances of the unit accessories (see Tables 25), and the static pressure resistance of the air duct system. With this information, the RPM for the supply air blower can be determined from the blower performance data (see Tables 27 - 46). Table 47 provides drive information for the sheaves supplied with the unit.

The supply air CFM must be within the limitations shown in Table 26.

BLOWER ROTATION

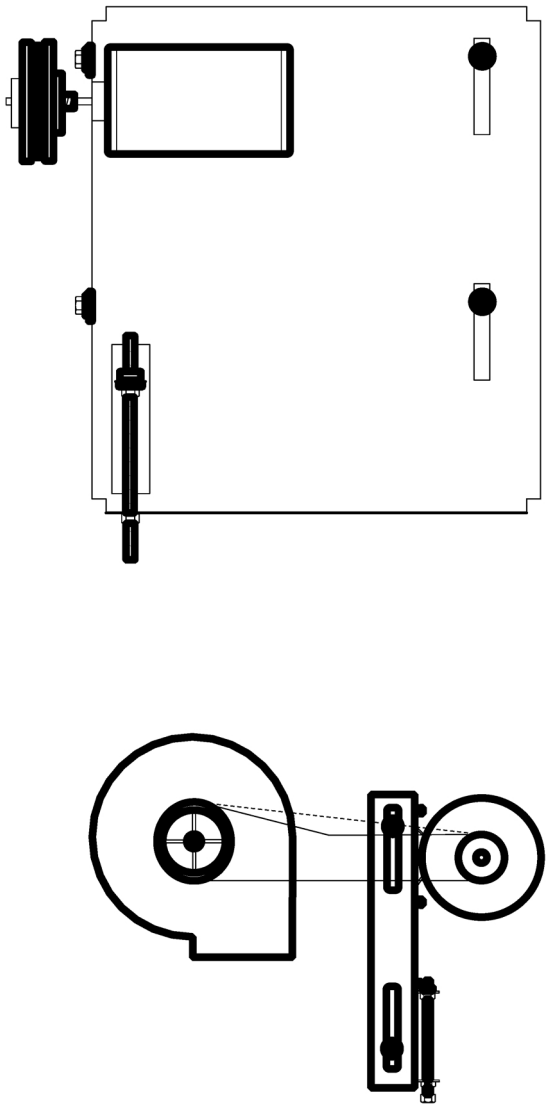
Check for proper supply air blower rotation. If the blower is rotating backwards, the line voltage at the unit point of power connection is misphased (See ‘PHASING.’).

TABLE 26: SUPPLY AIR LIMITATIONS

Unit Size	Minimum	Maximum
078	1950	3250
090	2250	3750
102	2550	4250
120	3000	5000
150	3750	6250

BELT TENSION

The tension on the belt should be adjusted as shown in Figure 20.



CAUTION

Procedure for adjusting belt tension:

1. *Loosen six nuts (top and bottom) A.*
2. *Adjust by turning (B).*
3. *Never loosen nuts (C).*
4. *Use belt tension checker to apply a perpendicular force to one belt at the midpoint of the span as shown. Deflection distance of 4mm (5/32") is obtained.*

   To determine the deflection distance from normal position, use a straight edge from sheave to sheave as reference line. The recommended deflection force is as follows:

   Tension new belts at the max. deflection force recommended for the belt section. Check the belt tension at least two times during the first 24 hours of operation. Any retensioning should fall between the min. and max. deflection force values.
5. *After adjusting retighten nuts (A).*

FIGURE 20 : BELT ADJUSTMENT

TABLE 27: 6-1/2 TON STANDARD MOTOR DOWN SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W† †	BHP	CFM	W† †	BHP
0.2	-	-	-	-	-	-	3291	1191	1.28	3096	1059	1.14	2963	948	1.02	2757	831	0.89
0.4	-	-	-	3168	1225	1.31	2969	1085	1.16	2658	939	1.01	2535	834	0.89	2255	718	0.77
0.6	3223	1273	1.37	2732	1084	1.16	2500	947	1.02	2110	803	0.86	1923	699	0.75	1608	596	0.64
0.8	2541	1091	1.17	2168	925	0.99	1882	793	0.85	-	-	-	-	-	-	-	-	-
1.0	1859	908	0.97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 28: 6-1/2 TON OPTIONAL MOTOR DOWN SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3489	1553	1.67
0.6	-	-	-	-	-	-	-	-	-	-	-	-	3394	1641	1.76	3101	1407	1.51
0.8	-	-	-	-	-	-	3623	2009	2.15	3323	1742	1.87	2971	1477	1.58	2607	1241	1.33
1.0	-	-	-	3643	2150	2.31	3224	1820	1.95	2889	1569	1.68	2466	1306	1.40	2009	1071	1.15
1.2	3613	2238	2.40	3143	1917	2.06	2748	1621	1.74	2369	1385	1.49	1879	1141	1.22	-	-	-
1.4	3099	2039	2.19	2636	1711	1.83	2195	1424	1.53	-	-	-	-	-	-	-	-	-
1.6	2586	1833	1.97	2124	1532	1.64	-	-	-	-	-	-	-	-	-	-	-	-
1.8	2073	1621	1.74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 29: 7-1/2 TON STANDARD MOTOR DOWN SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W† †	BHP	CFM	W† †	BHP
0.2	-	-	-	3715	1573	1.69	3634	1434	1.54	3431	1265	1.36	3218	901	0.97	3024	976	1.05
0.4	3650	1657	1.78	3510	1490	1.60	3320	1313	1.41	3079	1145	1.23	2832	810	0.87	2586	860	0.92
0.6	3334	1522	1.63	3146	1351	1.45	2910	1169	1.25	2621	1005	1.08	2307	706	0.76	-	-	-
0.8	2903	1352	1.45	2622	1167	1.25	2404	1013	1.09	2054	858	0.92	-	-	-	-	-	-
1.0	2356	1159	1.24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 30: 7-1/2 TON OPTIONAL MOTOR DOWN SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.2	-	-	-	-	-	-	-	-	-	-	-	-	3992	1904	2.04	3798	1679	1.80
0.4	-	-	-	-	-	-	-	-	-	3930	2017	2.16	3734	1786	1.92	3486	1552	1.66
0.6	-	-	-	-	-	-	3947	2176	2.33	3670	1895	2.03	3394	1641	1.76	3084	1401	1.50
0.8	-	-	-	4138	2384	2.56	3623	2009	2.15	3323	1742	1.87	2971	1477	1.58	2591	1236	1.33
1.0	4126	2430	2.61	3643	2145	2.30	3224	1820	1.95	2889	1569	1.68	2466	1306	1.40	-	-	-
1.2	3613	2238	2.40	3143	1921	2.06	2748	1621	1.74	2369	1385	1.49	-	-	-	-	-	-
1.4	3099	2039	2.19	2636	1714	1.84	2195	1424	1.53	-	-	-	-	-	-	-	-	-
1.6	2586	1833	1.97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 31: 8-1/2 TON STANDARD MOTOR DOWN SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.2	-	-	-	4090	1816	1.95	3872	1613	1.73	3681	1448	1.55	3420	1271	1.36	3217	1125	1.21
0.4	3783	1778	1.91	3782	1685	1.81	3548	1489	1.60	3334	1325	1.42	3026	1149	1.23	2796	1010	1.08
0.6	3648	1720	1.84	3387	1529	1.64	3123	1340	1.44	2874	1176	1.26	2495	1002	1.08	-	-	-
0.8	3317	1583	1.70	2903	1354	1.45	2599	1175	1.26	-	-	-	-	-	-	-	-	-
1.0	2788	1385	1.49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 32: 8-1/2 TON OPTIONAL MOTOR DOWN SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.4	-	-	-	-	-	-	-	-	-	4257	2325	2.49	4117	2079	2.23	3878	1816	1.95
0.6	-	-	-	-	-	-	4363	2596	2.78	4114	2248	2.41	3876	1961	2.10	3556	1676	1.80
0.8	-	-	-	4323	2776	2.98	4107	2446	2.62	3838	2104	2.26	3499	1788	1.92	3166	1520	1.63
1.0	4317	2968	3.18	4175	2677	2.87	3803	2276	2.44	3427	1905	2.04	2987	1577	1.69	2710	1355	1.45
1.2	4243	2918	3.13	3869	2486	2.67	3451	2089	2.24	2882	1669	1.79	-	-	-	-	-	-
1.4	3977	2743	2.94	3408	2225	2.39	3051	1888	2.03	-	-	-	-	-	-	-	-	-
1.6	3518	2467	2.65	2790	1927	2.07	2604	1679	1.80	-	-	-	-	-	-	-	-	-
1.8	2868	2125	2.28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 33: 10 TON STANDARD MOTOR DOWN SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.2	-	-	-	-	-	-	-	-	-	3896	1639	1.76	3688	1453	1.56	3447	1268	1.36
0.4	4040	2076	2.23	4005	1934	2.07	3790	1698	1.82	3569	1508	1.62	3333	1330	1.43	3057	1147	1.23
0.6	3890	2006	2.15	3697	1790	1.92	3427	1550	1.66	3152	1356	1.45	-	-	-	-	-	-
0.8	3620	1882	2.02	3324	1629	1.75	2972	1380	1.48	-	-	-	-	-	-	-	-	-
1.0	3227	1708	1.83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 34: 10 TON OPTIONAL MOTOR DOWN SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.4	4965	3485	3.74	4875	3150	3.38	4613	2739	2.94	4322	2374	2.55	4156	2106	2.26	3907	1860	1.99
0.6	4876	3416	3.66	4651	2997	3.21	4359	2582	2.77	4038	2220	2.38	3860	1966	2.11	3590	1724	1.85
0.8	4713	3291	3.53	4387	2823	3.03	4077	2417	2.59	3719	2059	2.21	3541	1827	1.96	3242	1584	1.70
1.0	4476	3116	3.34	4084	2632	2.82	3768	2245	2.41	3365	1892	2.03	3197	1691	1.81	-	-	-
1.2	4165	2898	3.11	3741	2427	2.60	3432	2070	2.22	-	-	-	-	-	-	-	-	-
1.4	3779	2646	2.84	3359	2212	2.37	3069	1895	2.03	-	-	-	-	-	-	-	-	-
1.6	3319	2372	2.54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 35: 12-1/2 TON STANDARD MOTOR DOWN SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.4	5078	3630	3.89	4809	3103	3.33	4594	3053	3.27	4360	2478	2.66	4090	2093	2.24	3812	1798	1.93
0.6	4865	3456	3.71	4584	2961	3.17	4349	2912	3.12	4106	2318	2.49	3814	1964	2.11	-	-	-
0.8	4642	3284	3.52	4356	2828	3.03	4089	2776	2.98	3840	2137	2.29	-	-	-	-	-	-
1.0	4408	3114	3.34	4124	2705	2.90	3815	2647	2.84	-	-	-	-	-	-	-	-	-
1.2	4164	2947	3.16	3889	2592	2.78	-	-	-	-	-	-	-	-	-	-	-	-
1.4	3910	2787	2.99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 36: 12-1/2 TON OPTIONAL MOTOR DOWN SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.4	5994	5400	5.79	5565	4369	4.69	5488	4169	4.47	5264	3599	3.86	4990	3085	3.31	4738	2812	3.02
0.6	5824	5216	5.59	5368	4186	4.49	5289	3991	4.28	5049	3437	3.69	4763	2937	3.15	4491	2655	2.85
0.8	5641	5022	5.39	5170	4012	4.30	5076	3807	4.08	4822	3272	3.51	4528	2790	2.99	4235	2497	2.68
1.0	5444	4819	5.17	4971	3846	4.12	4847	3618	3.88	4584	3103	3.33	4286	2644	2.83	3969	2340	2.51
1.2	5233	4609	4.94	4771	3687	3.95	4604	3426	3.67	4335	2933	3.15	4035	2499	2.68	-	-	-
1.4	5009	4394	4.71	4571	3537	3.79	4346	3233	3.47	4074	2762	2.96	3777	2356	2.53	-	-	-
1.6	4771	4174	4.48	4370	3395	3.64	4074	3040	3.26	3802	2590	2.78	-	-	-	-	-	-
1.8	4520	3951	4.24	4169	3262	3.50	3786	2850	3.06	-	-	-	-	-	-	-	-	-
2.0	4255	3728	4.00	3966	3137	3.36	-	-	-	-	-	-	-	-	-	-	-	-
2.2	3976	3505	3.76	3763	3020	3.24	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 37: 6-1/2 TON STANDARD MOTOR SIDE SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W ††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W† †	BHP	CFM	W† †	BHP
0.4	-	-	-	-	-	-	3367	1216	1.30	3133	1067	1.14	2954	944	1.01	2701	819	0.88
0.6	-	-	-	3208	1239	1.33	2913	1068	1.15	2466	913	0.98	2350	789	0.85	1750	621	0.67
0.8	-	-	-	2651	1058	1.13	2317	894	0.96	1656	700	0.75	-	-	-	-	-	-
1.0	2186	998	1.07	1774	830	0.89	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 38: 6-1/2 TON OPTIONAL MOTOR SIDE SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3597	1598	1.71
0.8	-	-	-	-	-	-	-	-	-	-	-	-	3503	1689	1.81	3172	1430	1.53
1.0	-	-	-	-	-	-				3406	1778	1.91	3032	1497	1.61	2248	1143	1.23
1.2	-	-	-	-	-	-	3327	1866	2.00	2926	1578	1.69	2160	1217	1.31	-	-	-
1.4	-	-	-	3270	1971	2.11	2537	1544	1.66	2043	1296	1.39	-	-	-	-	-	-
1.6	3196	2077	2.23	2460	1651	1.77	1858	1318	1.41	-	-	-	-	-	-	-	-	-
1.8	2426	1768	1.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 39: 7-1/2 TON STANDARD MOTOR SIDE SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W† †	BHP
0.4	-	-	-	-	-	-	3736	1476	1.58	3487	1284	1.38	3231	1109	1.19	3001	970	1.04
0.6	-	-	-	3572	1514	1.62	3389	1339	1.44	3094	1151	1.23	2764	972	1.04	2446	824	0.88
0.8	3422	1558	1.67	3179	1364	1.46	2889	1164	1.25	2554	985	1.06	-	-	-	-	-	-
1.0	2891	1347	1.44	2372	1088	1.17	2050	922	0.99	-	-	-	-	-	-	-	-	-
1.2	2017	1051	1.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 40: 7-1/2 TON OPTIONAL MOTOR SIDE SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3910	1726	1.85
0.6	-	-	-	-	-	-	-	-	-	-	-	-	3857	1842	1.98	3597	1430	1.53
0.8	-	-	-	-	-	-	-	-	-	3804	1957	2.10	3503	1689	1.81	3172	1430	1.53
1.0	-	-	-	-	-	-	3774	2088	2.24	3406	1778	1.91	3032	1497	1.61	2248	1143	1.23
1.2	-	-	-	-	-	-	3327	1866	2.00	2926	1578	1.69	2160	1217	1.31	-	-	-
1.4	-	-	-	3270	1971	2.11	2537	1544	1.66	2043	1296	1.39	-	-	-	-	-	-
1.6	3196	2077	2.23	2460	1651	1.77	-	-	-	-	-	-	-	-	-	-	-	-
1.8	2426	1768	1.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 41: 8-1/2 TON STANDARD MOTOR SIDE SHOT BLOWER PERFORMANCE * †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.4	-	-	-	4220	1873	2.01	3991	1659	1.78	3745	1468	1.57	3470	1283	1.38	3209	1120	1.20
0.6	-	-	-	3887	1729	1.85	3612	1514	1.62	3357	1330	1.43	3013	1146	1.23	2719	992	1.06
0.8	-	-	-	3516	1584	1.70	3219	1372	1.47	2903	2903	3.11	2343	966	1.04	-	-	-
1.0	3383	1614	1.73	3023	1391	1.49	2557	1161	1.25	-	-	-	-	-	-	-	-	-
1.2	2674	1341	1.44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 42: 8-1/2 TON OPTIONAL MOTOR SIDE SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4068	1902	2.04
0.8	-	-	-	-	-	-	-	-	-	4306	2348	2.52	4036	2050	2.20	3692	1742	1.87
1.0	-	-	-	-	-	-	4323	2579	2.77	3967	2172	2.33	3632	1848	1.98	3270	1552	1.66
1.2	-	-	-	-	-	-	4002	2389	2.56	3613	1996	2.14	3080	1613	1.73	2564	1307	1.40
1.4	-	-	-	4097	2632	2.82	3691	2210	2.37	2980	1706	1.83	-	-	-	-	-	-
1.6	4211	2896	3.11	3571	2313	2.48	3003	1869	2.00	-	-	-	-	-	-	-	-	-
1.8	3776	2623	2.81	2591	1849	1.98	-	-	-	-	-	-	-	-	-	-	-	-
2.0	2674	2038	2.19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 43: 10 TON STANDARD MOTOR SIDE SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.2	-	-	-	-	-	-	-	-	-	4368	1843	1.98	4132	1624	1.74	3870	1423	1.53
0.4	-	-	-	4515	2192	2.35	4213	1885	2.02	4020	1692	1.81	3791	1491	1.60	3499	1283	1.38
0.6	-	-	-	4192	2027	2.17	3905	1741	1.87	3657	1537	1.65	3383	1345	1.44	3062	1149	1.23
0.8	-	-	-	3838	1858	1.99	3534	1591	1.71	3236	1386	1.49	2934	1202	1.29	-	-	-
1.0	3755	1942	2.08	3489	1695	1.82	3081	1425	1.53	-	-	-	-	-	-	-	-	-
1.2	3337	1757	1.88	2918	1475	1.58	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 44: 10 TON OPTIONAL MOTOR SIDE SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.2	-	-	-	-	-	-	-	-	-	-	-	-	5067	2614	2.80	4809	2290	2.46
0.4	-	-	-	-	-	-	5179	3112	3.34	4884	2703	2.90	4729	2401	2.57	4459	2113	2.27
0.6	-	-	-	-	-	-	4925	2943	3.16	4585	2521	2.70	4429	2244	2.41	4137	1964	2.11
0.8	-	-	-	4974	3220	3.45	4607	2727	2.92	4267	2342	2.51	4099	2080	2.23	3783	1809	1.94
1.0	4975	3453	3.70	4657	2995	3.21	4305	2550	2.73	3941	2171	2.33	3751	1919	2.06	3371	1630	1.75
1.2	4679	3423	3.67	4366	2808	3.01	4022	2373	2.54	3545	1978	2.12	3305	1741	1.87	-	-	-
1.4	4429	3065	3.29	4040	2607	2.80	3669	2673	2.87	2918	1700	1.82	-	-	-	-	-	-
1.6	4107	2845	3.05	3620	2357	2.53	2931	1830	1.96	-	-	-	-	-	-	-	-	-
1.8	3553	2500	2.68	2756	1899	2.04	-	-	-	-	-	-	-	-	-	-	-	-
2.0	2439	1939	2.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 45: 12-1/2 TON STANDARD MOTOR SIDE SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.4	-	-	-	-	-	-	5201	3162	3.39	4966	2796	3.00	4681	2405	2.58	4355	2054	2.20
0.6	-	-	-	5220	3395	3.64	4942	2980	3.20	4657	2608	2.80	4358	2230	2.39	4007	1890	2.03
0.8	-	-	-	4944	3194	3.43	4661	2806	3.01	4378	2572	2.76	4016	2057	2.21	-	-	-
1.0	5003	3490	3.74	4647	2988	3.20	4380	2636	2.83	4030	2257	2.42	-	-	-	-	-	-
1.2	4724	3290	3.53	4363	2875	3.08	4012	2505	2.69	-	-	-	-	-	-	-	-	-
1.4	4428	3040	3.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 46: 12-1/2 TON OPTIONAL MOTOR SIDE SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.4	-	-	-	6447	5315	5.70	6207	4760	5.1046	5966	4205	4.51	5717	3716	3.98	5470	3307	3.55
0.6	-	-	-	6110	4917	5.27	5965	4464	4.79	5740	4023	4.31	5430	3501	3.75	5126	3054	3.28
0.8	-	-	-	5772	4519	4.85	5741	4274	4.58	5503	3821	4.10	5162	3294	3.53	4849	2870	3.08
1.0	6235	5521	5.92	5628	4407	4.73	5474	4048	4.34	5244	3611	3.87	4882	3101	3.33	4530	2667	2.86
1.2	5881	5137	5.51	5384	4205	4.51	5248	3854	4.13	4941	3387	3.63	4589	2906	3.12	4225	2502	2.68
1.4	5695	4950	5.31	5123	3996	4.29	5014	3670	3.94	4651	3178	3.41	4284	2716	2.91	3858	2280	2.45
1.6	5471	4728	5.07	4919	3828	4.11	4732	3460	3.71	4365	2983	3.20	3951	2516	2.70	3491	2058	2.21
1.8	5242	4514	4.84	4656	3611	3.87	4438	3240	3.47	3998	2740	2.94	3618	2316	2.48	-	-	-
2.0	4954	4231	4.54	4339	3380	3.62	3905	2861	3.07	3631	2497	2.68	-	-	-	-	-	-
2.2	4585	3934	4.22	4022	3149	3.38	-	-	-	-	-	-	-	-	-	-	-	-
2.4	4217	3637	3.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.6	3848	3340	3.58	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

NOTES FOR TABLE 27 THROUGH TABLE 46:

- Blower performance includes dry coil and two-inch filters.
- Blower performance for gas heat includes the maximum number of heat tubes available for each tonnage.
- ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

TABLE 47: INDOOR BLOWER SPECIFICATIONS

MODEL	MOTOR					MOTOR SHEAVE			BLOWER SHEAVE			BELT
	HP	RPM	Eff.	SF	Frame	Datum Dia. (in.)	Bore (in.)	Model	Datum Dia. (in.)	Bore (in.)	Model	
DM078	1-1/2	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	9.5	1	AK99	A58
	2	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	7.5	1	AK79	A55
DH078	1-1/2	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	9.5	1	AK99	A58
	2	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	7.5	1	AK79	A55
DM090	1-1/2	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	9.0	1	AK94	A57
	2	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	7.5	1	AK79	A55
DH090	1-1/2	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	9.0	1	AK94	A57
	2	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	7.5	1	AK79	A55
DM102	2	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	9.0	1	AK94	A56
	3	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	7.0	1	AK74	A54
DH102	2	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	9.0	1	AK94	A56
	3	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	7.0	1	AK74	A54
DM120	2	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	8.5	1	AK89	A56
	3	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	7.0	1	AK74	A54
DH120	2	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	8.5	1	AK89	A56
	3	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	7.0	1	AK74	A54
DM150	3	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	7.0	1	AK74	A54
	5	1725	87%	1.15	184T	4.3 - 5.3	1 1/8	1VP56	6.7	1	BK77	BX55
DH150	3	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	7.0	1	AK74	A54
	5	1725	87%	1.15	184T	4.3 - 5.3	1 1/8	1VP56	6.7	1	BK77	BX55

AIR BALANCE

Start the supply air blower motor. Adjust the resistances in both the supply and the return air duct systems to balance the air distribution throughout the conditioned space. The job specifications may require that this balancing be done by someone other than the equipment installer.

CHECKING AIR QUANTITY

1. Remove the dot plugs from the duct panel (for location of the dot plugs see figure 10).
2. Insert eight-inches of 1/4 inch metal tubing into the airflow on both sides of the indoor coil.

NOTE: The tubes must be inserted and held in a position perpendicular to the air flow so that velocity pressure will not affect the static pressure readings.

3. Use an inclined manometer to determine the pressure drop across a dry evaporator coil. Since the moisture on an evaporator coil can vary greatly, measuring the pressure drop across a wet coil under field conditions could be inaccurate. To assure a dry coil, the compressors should be de-activated while the test is being run.

NOTE: De-energize the compressors before taking any test measurements to assure a dry evaporator coil.

4. The CFM through the unit with clean 2 inch filters can be determined from the pressure drop indicated by the manometer by referring to the curves in the supplement.
5. After readings have been obtained, remove the tubes and replace the dot plugs.

⚠ WARNING

Failure to properly adjust the total system air quantity can result in extensive blower damage.

SUPPLY AIR DRIVE ADJUSTMENT

⚠ CAUTION

Before making any blower speed changes review the installation for any installation errors, leaks or undesirable systems effects that can result in loss of airflow.

Even small changes in blower speed can result in substantial changes in static pressure and BHP. BHP and AMP draw of the blower motor will increase by the cube of the blower speed. Static pressure will increase by the square of the blower speed. Only qualified personnel should make blower speed changes, strictly adhering to the fan laws.

At unit start-up, the measured CFM may be higher or lower than the required CFM. To achieve the required CFM, the speed of the drive may have adjusted by changing the datum diameter (DD) of the variable pitch motor sheave as described below:

$$\left(\frac{\text{Specified CFM}}{\text{Measured CFM}}\right) \bullet \text{Existing DD} = \text{New DD}$$

Use the following tables and the DD calculated per the above equation to adjust the motor variable pitch sheave.

EXAMPLE

A 10 ton unit was selected to deliver 4,000 CFM with a 5 HP motor, but the unit is delivering 3,750 CFM. The variable pitch motor sheave is set at 2 turns open.

Use the equation to determine the required DD for the new motor sheave,

$$\left(\frac{4{,}000\ \text{CFM}}{3{,}750\ \text{CFM}}\right) \bullet 4.0\ \text{in.} = 4.26\ \text{in.}$$

Use Table 48 to locate the DD nearest to 4.26 in. Close the sheave to 1/2 turn open.

New BHP

$= (\text{Speed increase})^3 \bullet \text{BHP at 3,750 CFM}$

$= (\text{Speed increase})^3 \bullet \text{Original BHP}$

$= \text{New BHP}$

New motor Amps

$= (\text{Speed increase})^3 \bullet \text{Amps at 3,750 CFM}$

$= (\text{Speed increase})^3 \bullet \text{Orignial Amps}$

$= \text{New Amps}$

TABLE 48: MOTOR SHEAVE DATUM DIAMETERS

1VM50x7/8 (1-1/2, 2 & 3 HP Motor)		1VP56x1-1/8 (5 HP Motor)	
Turns Open	**Datum Diameter**	**Turns Open**	**Datum Diameter**
0	**4.4**	1	5.3
1/2	**4.3**	1-1/2	5.2
1	**4.2**	2	5.1
1-1/2	**4.1**	2-1/2	5.0
2	**4.0**	3	4.9
2-1/2	**3.9**	3-1/2	4.8
3	**3.8**	4	4.7
3-1/2	**3.7**	4-1/2	4.6
4	**3.6**	5	4.5
4-1/2	**3.5**	5-1/2	4.4
5	**3.4**	6	4.3

GAS FURNACE OPERATION

⚠ CAUTION

This furnace is equipped with an automatic ignition system. Do not attempt to manually light the burners.

TABLE 49: GAS APPLICATION

Unit Size	Unit Opt.	Input (MBH)	Output (MBH)	Temp Rise (°F)
078	**10**	120	96	20-50
	15	180	144	35-65
090	**10**	120	96	15-45
	15	180	144	30-60
102	**10**	120	96	10-40
	15	180	144	25-55
120	**15**	180	144	20-50
	20	240	192	30-60
150	**15**	180	144	10-40
	20	240	192	20-50

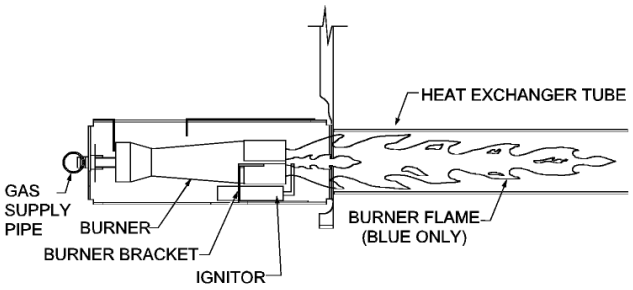


FIGURE 21 : TYPICAL FLAME

BURNERS/ORIFICES INSPECTION/SERVICING

Before checking or changing burners, pilot or orifices, CLOSE MAIN MANUAL SHUT-OFF VALVE AND SHUT OFF ALL POWER TO THE UNIT.

1. Open the union fitting just upstream of the unit gas valve and downstream from the main manual shut-off valve in the gas supply line.
2. Remove the screws holding each end of the manifold to the manifold supports.
3. Disconnect wiring to the gas valves and spark igniter(s). Remove the manifold & gas valve assembly. Orifices can now be inspected and/or replaced.

To service burners, complete step 4.

4. Remove the heat shield on top of the manifold supports. Burners are now accessible for inspection and/or replacement.

NOTE: Reverse the above procedure to replace the assemblies.

Make sure that burners are level and seat at the rear of the gas orifice.

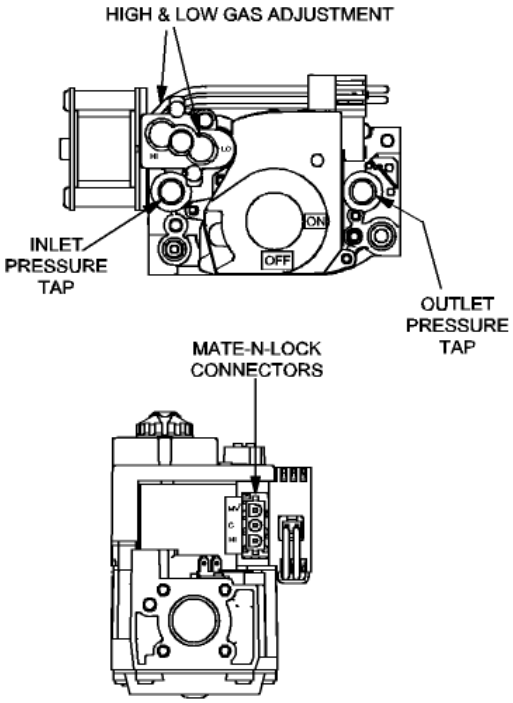


FIGURE 22 : TYPICAL GAS VALVE

LIGHTING THE MAIN BURNERS

1. Turn “OFF” electric power to unit.
2. Turn room thermostat to lowest setting.
3. Turn gas valve counter-clockwise to “ON” position (See Figure 19).
4. Turn “ON” electric power to unit.

5. If thermostat set temperature is above room temperature, the main burners will ignite. If a second stage of heat is called for, the main burners for second stage heat will ignite for the second stage heat.

POST START CHECKLIST

After the entire control circuit has been energized and the heating section is operating, make the following checks:

1. Check for gas leaks in the unit piping as well as the supply piping.
2. Check for correct manifold gas pressures. (See 'CHECKING GAS INPUT.')
3. Check the supply gas pressure. It must be within the limits shown on the rating nameplate. Supply pressure should be checked with all gas appliances in the building at full fire. At no time should the standby gas pressure exceed 13 in. or the operating pressure drop below 5.3 in for natural gas units. If gas pressure is outside these limits, contact the local gas utility or propane supplier for corrective action.

SHUT DOWN

1. Set the thermostat to the lowest temperature setting.
2. Turn "OFF" all electric power to unit.
3. Open gas heat access panel.
4. Turn gas valve clockwise to "OFF" position (See Figure 22).

MANIFOLD GAS PRESSURE ADJUSTMENT

This gas furnace has two heat stages. Therefore, the gas valve has two adjustment screws located under a plastic protective cover. The second stage (100% input) adjustment screw is adjacent to the "HI" marking on the valve and the first stage (60% input) adjustment screw is located adjacent to the "LO" marking on the valve (See Figure 22).

Manifold pressure adjustment procedure.

Adjust second stage (100% input) pressure first, then adjust first stage (60% input) pressure.

1. Turn off all power to the unit.
2. Using the outlet pressure port on the gas valve, connect a manometer to monitor the manifold pressure.
3. Remove plastic cap covering HI and LO pressure adjustment screws.
4. Turn on power to the unit.
5. Set thermostat to call for second stage heat and start furnace.
6. If necessary, using a screwdriver, turn the second stage adjustment screw (adjacent to the "HI" marking on the valve) clockwise to increase manifold pressure or counterclockwise to decrease manifold pressure. Be sure not to over-fire the unit on second stage.
7. After the high manifold pressure has been checked, adjust the thermostat to call for first stage heat.
8. If necessary, using a screwdriver, turn the first stage adjustment screw (adjacent to the "LO" marking on the valve) clockwise to increase manifold pressure or counterclockwise to decrease manifold pressure. Be sure not to under-fire the unit on first stage.
9. Once pressure has been checked, replace the plastic cap covering the HI and LO pressure adjustment screws.

NOTE: When using natural gas, the manifold pressure for second stage (100% input) should be 3.5 IWG ± 0.3. The manifold pressure for first stage (60% input) when using natural gas should be 1.5 IWG ± 0.3.

ADJUSTMENT OF TEMPERATURE RISE

The temperature rise (the difference of temperature between the return air and the heated air from the furnace) must lie within the range shown on the CSA rating plate and the data in Table 49.

After the temperature rise has been determined, the CFM can be calculated as follows:

$$\text{CFM} = \text{Btu Input} \bullet \frac{0.8}{(1.08 \cdot \Delta°\text{F})}$$

After about 20 minutes of operation, determine the furnace temperature rise. Take readings of both the return air and the heated air in the ducts (about 6 feet from the furnace) where they will not be affected by radiant heat. Increase the blower CFM to decrease the temperature rise; decrease the blower CFM to increase the rise (See 'SUPPLY AIR DRIVE ADJUSTMENT').

NOTE: Each gas heat exchanger size has a minimum allowable CFM. Below this CFM, the limit will open below this rating.

CHECKING GAS INPUT

NATURAL GAS

This unit has two stages of gas heat. The first stage is 60% of the full fire input and is considered the minimum input for the furnace. The intended input for each furnace is shown in the table below. The following Table applies to units operating on 60 Hz power only.

TABLE 50: GAS HEAT STAGES

# of Burner Tubes	2nd Stage Input (100% Btuh)	1st Stage Input (60%) Btuh
4	120,000	72,000
6	180,000	108,000
8	240,000	144,000

1. To determine the rate of gas flow (second Stage).
2. Turn of all other gas appliances connected to the gas meter.
3. Turn on the furnace and make sure the thermostat is calling for Second stage (100% input) heat.
4. Measure the time needed for one revolution of the hand on the smallest dial on the meter. A typical gas meter has a 1/2 or a 1 cubic foot test dial.
5. Using the number of seconds it takes for one revolution of the dial, calculate the cubic feet of gas consumed per hour. (See example below).
6. If necessary, adjust the high pressure regulator as discussed in the section “Manifold Gas Pressure Adjustment”. **Be sure not to over-fire** the furnace on Second stage. If in doubt, it is better to leave the Second stage of the furnace slightly under-fired. Repeat Steps 1-5.

To determine the rate of gas flow (First Stage)

1. Turn of all other gas appliances connected to the gas meter.
2. Turn on the furnace and make sure the thermostat is calling for first stage (60% input) heat.
3. Even when the thermostat is calling for first stage heat, the unit will light on second stage and will run on Second stage for 1 minute. Allow this one-minute time period to expire and be certain the unit is running on first stage.
4. Measure the time needed for one revolution of the hand on the smallest dial on the meter. A typical gas meter has a 1/2 or a 1 cubic foot test dial.
5. Using the number of seconds it takes for one revolution of the dial, calculate the cubic feet of gas consumed per hour (See example below).
6. If necessary, adjust the low pressure regulator as discussed in the section “Manifold Gas Pressure Adjustment”. **Be sure not to under-fire** the furnace on first stage. If in doubt, it is better to leave the first stage of the furnace slightly over-fired (greater than 60% input). Repeat Steps 1-6.

TABLE 51: GAS RATE CUBIC FEET PER HOUR

Seconds for One Rev.	Size of Test Dial	
	1/2 cu. ft.	1 cu. ft.
10	180	360
12	150	300
14	129	257
16	113	225
18	100	200
20	90	180
22	82	164
24	75	150
26	69	138
28	64	129
30	60	120
32	56	113
34	53	106
36	50	100
38	47	95
40	45	90
42	43	86
44	41	82
46	39	78
48	37	75
50	36	72
52	35	69
54	34	67
56	32	64
58	31	62
60	30	60

NOTE: To find the Btu input, multiply the number of cubic feet of gas consumed per hour by the Btu content of the gas in your particular locality (contact your gas company for this information as it varies widely from area to area).

EXAMPLE

By actual measurement, it takes 19 seconds for the hand on a 1 cubic foot dial to make a revolution with a 192,000 Btuh furnace running. To determine rotations per minute, divide 60 by 19 = 3.16. To calculate rotations per hour, multiply 3.16 • 60 = 189.6. Multiply 189.6 • 1 (0.5 if using a 1/2 cubic foot dial) = 189.6. Multiply 189.6 • (the Btu rating of the gas). For this example, assume the gas has a Btu rating of 1050 Btu/ft.^{3}. The result of 199,000 Btuh is within 5% of the 192,000 Btuh rating of the furnace.

COOLING OPERATION INSTRUCTIONS

COOLING SYSTEM PRELIMINARY OPERATION

After installation has been completed, energize the crankcase heaters for at least four hours before operating unit. After this initial warm-up, the **compressors** should be given three false starts (energized just long enough to make a few revolutions) with 5-7 minutes of delay between each start before being put into full time service.

NOTE: Prior to each cooling season, the crankcase heaters must be energized at least 10 hours before the system is put into operation.

TURN ON THE POWER TO THE UNIT

1. Set the room thermostat setting to lower than the room temperature.
2. First stage compressors will energize after the built-in time delay (five minutes).
3. The second stage of the thermostat will energize second stage compressor if needed.

POST START CHECK LIST

VERIFY PROPER SYSTEM PRESSURES FOR BOTH CIRCUITS

1. Check the unit air flower (CFM). See “CHECKING AIR QUANTITY” on page 41.
2. Measure the temperature drop across the evaporator coil.
3. Check the voltage input.
4. Measure the system Amperage draw across all legs of 3 phase power wires.
5. Measure the condenser fan amps draw.
6. Measure evaporator fan motor’s amp draw.

SHUT DOWN

1. Set the thermostat to highest temperature setting.
2. Turn off the electrical power to the unit.

SEQUENCE OF OPERATIONS

OVERVIEW

For the Predator™ series of units, the thermostat makes a circuit between “R” and “Y1” for the first stage of cooling.

The call is passed to the unit control board (UCB), which then determines whether the requested operation is available and, if so, which components to energize.

For gas heating, the UCB monitors the “W1” call but does not handle the operation of the gas furnace. An ignition control board controls the gas heater operation. For electric heat units, the UCB passes the call to the electric heater. In both cases, when the “W1” call is sensed, the indoor air blower is energized following a specified heating delay.

If at any time a call for both heating and cooling are present, the heating operation will be performed. If operating, the cooling system is halted as with a completion of a call for cooling. Heating always takes priority.

SAFETY CONTROLS

ThePredator™ unit control board monitors the following inputs for each cooling system:

1. A suction line freezestat to protect against low evaporator temperatures due to a low airflow or a low return air temperature, (opens at 26 ± 5 °F and resets at 38 ± 5 °F).
2. A high-pressure switch to protect against excessive discharge pressures due to a blocked condenser coil or a condenser motor failure, (opens at 405 ± 10 psig and resets at 300 ± 10 psig).
3. A low-pressure switch to protect against loss of refrigerant charge, (opens at 7 ± 3 psig and resets at 22 ± 5 psig).

The above pressure switches are hard-soldered to the unit. The refrigeration systems are independently monitored and controlled. On any fault, only the associated system will be effected by any safety/preventive action. The other refrigerant system will continue in operation unless it is effected by the fault as well.

The unit control board monitors the temperature limit switch of electric heat units and the temperature limit switch and the gas valve of gas furnace units.

The ignition control board monitors the temperature limit switch, the rollout switch, the draft motor proving switch, the flame sensor, and the gas valve.

PROTECTION

The compressors also have inherent (internal) protection. If there is an abnormal temperature rise in a compressor, the protector will open to shut down the compressor.

The UCB incorporates features to minimize compressor wear and damage. An anti-short cycle delay (ASCD) is utilized to prevent operation of a compressor too soon after its previous run. Additionally, a minimum run time is imposed any time a compressor is energized.

The ASCD is initiated on unit start-up and on any compressor reset or lock-out.

CONTINUOUS BLOWER

By setting the room thermostat to “ON,” the supply air blower will operate continuously.

INTERMITTENT BLOWER

With the room thermostat fan switch set to “AUTO” and the system switch set to either the “AUTO” or “HEAT” settings, the blower is energized whenever a cooling or heating operation is requested. The blower is energized after any specified delay associated with the operation.

When energized, the indoor blower has a minimum run time of 30 seconds. Additionally, the indoor blower has a delay of 10 seconds between operations.

COOLING SEQUENCE OF OPERATION

When the thermostat calls for the first stage of cooling, the low-voltage control circuit from “R” to “Y1” and “G” is completed. The UCB energizes the economizer (if installed and free cooling is available) or the first available compressor* and the condenser fans. For first stage cooling, compressor #1 is energized. If compressor #1 is unavailable, compressor #2 is energized. After completing the specified fan on delay for cooling, the UCB will energize the blower motor.

When the thermostat calls for the second stage of cooling, the low-voltage control circuit from “R” to “Y2” is completed. The control board energizes the first available compressor. If free cooling is being used for the first stage of cooling, compressor #1 is energized. If compressor #1 is active for first stage cooling or the first compressor is locked-out, compressor #2 is energized. In free-cooling mode, if the call for the second stage of cooling continues for 20 minutes, compressor #2 is energized, provided it has not been locked-out.

If there is an initial call for both stages of cooling, the UCB will delay energizing compressor #2 by 30 seconds in order to avoid a power rush.

Once the thermostat has been satisfied, the it will de-energize Y1 and Y2. If the compressors have satisfied their minimum run times, the compressors and condenser fans are de-energized. Otherwise, the unit operates each cooling system until the minimum run times for the compressors have been completed. Upon the final compressor de-energizing, the blower is stopped following the elapse of the fan off delay for cooling.

* To be available, a compressor must not be locked-out due to a high or low-pressure switch or freezestat trip and the anti-short cycle delay (ASCD) must have elapsed.

COOLING OPERATION ERRORS

Each cooling system is monitored for operation outside of the intended parameters. Errors are handled as described below. All system errors override minimum run times for compressors.

HIGH-PRESSURE LIMIT SWITCH

During cooling operation, if a high-pressure limit switch opens, the UCB will de-energize the associated compressor, initiate the ASCD, and, if the other compressor is idle, stop the condenser fans. If the call for cooling is still present at the conclusion of the ASCD, the UCB will re-energize the halted compressor.

Should a high-pressure switch open three times within two hours of operation, the UCB will lock-out the associated compressor and flash a code (see Table 60). If the other compressor is inactive, the condenser fans will be de-energized.

LOW-PRESSURE LIMIT SWITCH

The low-pressure limit switch is not monitored during the initial 30 seconds of a cooling system’s operation. For the following 30 seconds, the UCB will monitor the low-pressure switch to ensure it closes. If the low-pressure switch fails to close after the 30-second monitoring phase, the UCB will de-energize the associated compressor, initiate the ASCD, and, if the other compressor is idle, stop the condenser fans.

Once the low-pressure switch has been proven (closed during the 30-second monitor period described above), the UCB will monitor the low-pressure limit switch for any openings. If the low-pressure switch opens for greater than 5 seconds, the UCB will de-energize the associated compressor, initiate the ASCD, and, if the other compressor is idle, stop the condenser fans.

If the call for cooling is still present at the conclusion of the ASCD, the UCB will re-energize the halted compressor.

Should a low-pressure switch open three times within one hour of operation, the UCB will lock-out the associated compressor and flash a code (Table 60). If the other compressor is inactive, the condenser fans will be de-energized.

FREEZESTAT

During cooling operation, if a freezestat opens, the UCB will de-energize the associated compressor, initiate the ASCD, and, if the other compressor is idle, stop the condenser fans. If the call for cooling is still present at the conclusion of the ASCD, the UCB will re-energize the halted compressor.

Should a freezestat open three times within two hours of operation, the UCB will lock-out the associated compressor and flash a code (Table 60). If the other compressor is inactive, the condenser fans will be de-energized.

FLASH CODES

When the UCB has locked-out a compressor, the UCB will initiate a flash code associated with the error. Also, if the thermostat is so equipped, the UCB will energize the thermostat trouble light.

RESET

Remove the call for cooling, by raising thermostat setting higher than the space temperature. This resets any pressure or freezestat flash codes.

GAS HEATING SEQUENCE OF OPERATIONS

When the thermostat calls for the first stage of heating, the low-voltage control circuit from “R” to “W1” is completed. A call for heat passes through the UCB to the ignition control board (ICB). The UCB monitors the “W1” call and acts upon any call for heat by monitoring the gas valve (GV). Once voltage has been sensed at the GV, the UCB will initiate the fan on delay for heating, energizing the indoor blower the specified delay has elapsed.

When the thermostat has been satisfied, heating calls are ceased. The GV is immediately closed. The blower is de-energized after the fan off delay for heating has elapsed. The draft motor performs a 30-second post purge.

IGNITION CONTROL BOARD

FIRST STAGE OF HEATING

When the ICB receives a call for first stage of heating, “W1,” the draft motor is energized. Once the draft motor has been proven, a 30-second purge is initiated. At the end of the purge, both main valves of the GV are opened, and the spark ignitor is energized for 10 seconds. The ICB then checks for the presence of flame. If flame is detected, the ICB enters a flame stabilization period. If flame was not detected, both main valves close, and a retry operation begins.

During the flame stabilization period, a loss of the flame for 2 seconds will cause the main valves to close and the retry operation to begin. After the flame stabilization period, a loss of flame for 3/4 second will cause the main valves to close and the retry operation to begin.

At the conclusion of the flame stabilization period, the ICB will operate the gas heat in high fire (both valves open) for an additional 100 seconds (for a total for 120 seconds of high fire operation). After this 100 seconds, the ICB will then use the call for the second stage of heat to control the second main valve of the GV.

When “W1” is satisfied, both valves are closed.

SECOND STAGE OF HEATING

When the ICB receives a call for the second stage of heating, “W2,” the ICB conducts a complete first stage ignition sequence. If this sequence is satisfied, the second main valve of the GV is opened.

When “W2” is satisfied, the second main valve is closed.

RETRY OPERATION

When a flame is lost or is not detected during an attempt to achieve ignition, a retry operation occurs. A 30-second purge is performed between ignition attempts.

If the unit fails after three ignition attempts, the furnace is locked-out for one hour. The furnace is monitored during this one-hour period for unsafe conditions.

RECYCLE OPERATION

When a flame is lost after the flame stabilization period, a recycle operation occurs. If the unit fails after five recycle attempts, the furnace is locked-out for one hour.

GAS HEATING OPERATION FAULTS

LOCK-OUT

A one-hour lockout occurs following three retries or five recycles. During the one-hour lockout, flame detection, limit conditions, and main valves are tested. Any improper results will cause the appropriate action to occur. Recycling the low voltage power cancels the lock-out.

TEMPERATURE LIMIT

If the UCB senses zero volts from the high temperature limit, the indoor blower motor is immediately energized. When the UCB again senses 24 volts from the temperature limit, the draft motor will perform a 15-second post-purge and the indoor blower will be de-energized following the elapse of the fan off delay for heating.

This limit is monitored regardless of unit operation status, i.e. this limit is monitored at all time.

If the temperature limit opens three times within one hour, it will lock-on the indoor blower motor and flash code is initiated (See Table 60).

FLAME SENSE

Flame sensing occurs at all times. If “W1” is not present and a flame is sensed for 2 seconds, the draft motor is energized and the main valve is kept off. The ICB halts any operation until a flame is not detected. Once the flame detection is lost, the ICB performs a post-purge. Normal operation is allowed concurrently with the purge (i.e. this purge can be considered the purge associated with a call for “W1”).

If “W1” is present, a flame is sensed, but the main valve is not energized, the draft motor is energized until the flame detection is lost. Normal operation is now allowed.

The flame detection circuitry continually tests itself. If the ICB finds the flame detection circuitry to be faulty, the ICB will not permit an ignition sequence. Also, the draft motor is energized. If this failure should occur during an ignition cycle the failure is counted as a recycle.

GAS VALVE

The UCB and ICB continuously monitor the GV.

If the ICB senses voltage at the GV when not requested, the ICB will energize the draft motor. The ICB will not operate the furnace until voltage is no longer sensed at the GV. The draft motor is stopped when voltage is not sensed at the GV.

Any time the UCB senses voltage at the GV without a call for heat for a continuous five-minute period, the UCB will lock-on the indoor blower and a flash code is initiated (Table 60). When voltage is no longer sensed at the GV, the UCB will de-energize the indoor blower following the elapse of the fan off delay for heating.

If voltage has been sensed at the GV for at least 15 seconds during the fan on delay for heating and GV voltage or “W1” is lost, the indoor blower is forced on for the length of the fan off delay for heating.

During a call for heat, if the UCB does not sense voltage at the GV for a continuous five-minute period the UCB will initiate a flash code (Table 60). The indoor blower motor will not be locked-on while there is no GV voltage.

However, if during a normal ignition sequence, the NPC has been tested to be open, IDM energized, NPC closes and then the first stage main valve (MV1) is detected as being on, the ignition sequence stops and the IDM is de-energized. (Since the NPC is wired serially with the main valve relays, de-energizing the IDM will open the NPC). This failure is counted as a recycle and will result in an eventual recycle lockout. If the main valve continues to be energized after the IDM is de-energized the IDM is re-energized. The second stage (MV2) main valve is not monitored for closure after energization.

PRESSURE SWITCH

Once the draft motor has been proven during a normal ignition sequence, if proving is lost for 2 seconds, the GV will be de-energized, the ignition cycle is aborted, and the ICB flashes the appropriate code. The draft motor is energized until again proven or “W1” is lost.

ROLLOUT SWITCH

The rollout switch is wired in series with the draft motor proving switch. As such, the ICB cannot distinguish the rollout switch operation from that of the draft motor proving switch. Consequently, the control will only respond as in the same manner as outlined above (under Pressure Switch). An open rollout will inhibit the gas valve from actuating.

INTERNAL MICROPROCESSOR FAILURE

If the ICB detects an internal failure, it will turn cease all outputs, ignore inputs, and display the proper flash code for control replacement. The ICB remains in this condition until replaced.

LOW AMBIENT COOLING

To determine when to operate in low ambient mode, the UCB has a pair of terminals connected to a temperature-activated switch. When the low ambient switch is closed and the thermostat is calling for cooling, the UCB will operate in the low ambient mode.

Low ambient mode operates the compressors in this manner: 10 minutes on, 5 minutes off. The indoor blower is operated throughout the cycle. The 5-minute off period is necessary to defrost the indoor coil.

Low ambient mode always begins with compressor operation. Compressor minimum run time may extend the minutes of compressor operation. The defrost cycle will begin immediately following the elapse of the minimum run time.

When operating in low ambient mode, the UCB will not lockout the compressors due to a freezestat trip. However, a freezestat trip will de-energize the associated compressor. If the call for cooling is still present at the end of the ASCD and the freezestat has closed, the unit will resume operation.

TABLE 52: 6.5 TON STANDARD EFFICIENCY SUPERHEAT CHARGING

Outdoor Temp (°F)	Superheat at Compressor Suction (°F) Airflow = 2500 CFM										
	Indoor WB Temp (°F)										
	55	57	59	61	63	65	67	69	71	73	75
65	21.9	22.6	23.2	23.9	24.6	25.3	26.0	27.4	28.9	30.4	31.9
70	18.1	19.1	20.0	21.0	22.0	22.9	23.9	25.5	27.2	28.9	30.5
75	14.4	15.6	16.8	18.1	19.3	20.6	21.8	23.7	25.5	27.3	29.1
80	10.6	12.1	13.7	15.2	16.7	18.2	19.8	21.8	23.8	25.8	27.8
85	6.8	8.7	10.5	12.3	14.1	15.9	17.7	19.9	22.1	24.2	26.4
90	-	6.2	8.0	9.8	11.6	13.4	15.3	17.8	20.4	23.0	25.5
95	-	-	5.6	7.4	9.2	11.0	12.8	15.8	18.7	21.7	24.6
100	-	-	5.1	6.5	7.8	9.2	10.5	13.2	16.0	18.7	21.4
105	-	-	-	5.6	6.5	7.4	8.3	10.7	13.2	15.7	18.2
110	-	-	-	-	5.2	5.6	6.0	8.2	10.5	12.7	14.9
115	-	-	-	-	-	-	-	5.7	7.7	9.7	11.7

TABLE 53: 7.5 TON STANDARD EFFICIENCY SUPERHEAT CHARGING

Outdoor Temp (°F)	Superheat at Compressor Suction (°F) Airflow = 3000 CFM										
	Indoor WB Temp (°F)										
	55	57	59	61	63	65	67	69	71	73	75
65	10.6	13.5	16.3	19.1	22.0	24.8	27.7	29.1	30.5	32.0	33.4
70	8.4	11.1	13.8	16.5	19.3	22.0	24.7	26.5	28.4	30.2	32.0
75	6.1	8.7	11.3	13.9	16.6	19.2	21.8	24.0	26.2	28.4	30.6
80	-	6.4	8.9	11.4	13.9	16.3	18.8	21.4	24.0	26.6	29.2
85	-	-	6.4	8.8	11.1	13.5	15.9	18.9	21.9	24.8	27.8
90	-	-	5.8	7.9	10.1	12.2	14.3	17.2	20.2	23.1	26.1
95	-	-	5.3	7.1	9.0	10.8	12.7	15.6	18.5	21.5	24.4
100	-	-	-	6.3	7.7	9.0	10.4	13.5	16.6	19.7	22.8
105	-	-	-	5.5	6.4	7.3	8.1	11.4	14.6	17.9	21.2
110	-	-	-	-	5.1	5.5	5.9	9.3	12.7	16.1	19.5
115	-	-	-	-	-	-	-	7.2	10.8	14.3	17.9

TABLE 54: 8.5 TON STANDARD EFFICIENCY SUPERHEAT CHARGING

Outdoor Temp (°F)	Superheat at Compressor Suction (°F) Airflow = 3400 CFM										
	Indoor WB Temp (°F)										
	55	57	59	61	63	65	67	69	71	73	75
65	5.5	8.5	11.5	14.4	17.4	20.3	23.3	25.0	26.6	28.3	29.9
70	-	6.4	9.6	12.7	15.9	19.1	22.3	24.1	25.9	27.7	29.5
75	-	-	7.7	11.1	14.5	17.9	21.3	23.2	25.1	27.0	29.0
80	-	-	5.7	9.4	13.0	16.6	20.2	22.3	24.4	26.4	28.5
85	-	-	-	7.7	11.5	15.4	19.2	21.4	23.6	25.8	28.0
90	-	-	-	6.5	9.7	13.0	16.2	18.9	21.7	24.4	27.2
95	-	-	-	5.3	7.9	10.6	13.2	16.5	19.8	23.0	26.3
100	-	-	-	-	5.9	7.9	9.9	13.7	17.5	21.3	25.1
105	-	-	-	-	-	5.3	6.6	10.9	15.2	19.5	23.8
110	-	-	-	-	-	-	-	8.1	12.9	17.7	22.5
115	-	-	-	-	-	-	-	5.3	10.6	16.0	21.3

TABLE 55: 10 TON STANDARD EFFICIENCY SUPERHEAT CHARGING

Outdoor Temp (°F)	Superheat at Compressor Suction (°F) Airflow = 4000 CFM										
	Indoor WB Temp (°F)										
	55	57	59	61	63	65	67	69	71	73	75
65	19.6	20.8	22.0	23.2	24.4	25.6	26.9	28.4	29.9	31.4	32.9
70	14.4	16.0	17.5	19.0	20.5	22.0	23.5	25.4	27.3	29.2	31.0
75	9.3	11.1	12.9	14.7	16.6	18.4	20.2	22.4	24.7	26.9	29.1
80	-	6.3	8.4	10.5	12.6	14.8	16.9	19.5	22.0	24.6	27.2
85	-	-	-	6.3	8.7	11.1	13.6	16.5	19.4	22.4	25.3
90	-	-	-	5.6	7.8	9.9	12.0	15.0	17.9	20.8	23.7
95	-	-	-	-	6.8	8.7	10.5	13.4	16.3	19.3	22.2
100	-	-	-	-	5.3	6.7	8.1	10.8	13.5	16.2	18.9
105	-	-	-	-	-	-	5.7	8.1	10.6	13.1	15.5
110	-	-	-	-	-	-	-	5.5	7.7	10.0	12.2
115	-	-	-	-	-	-	-	-	-	6.9	8.9

TABLE 56: 12.5 TON STANDARD EFFICIENCY SUPERHEAT CHARGING

Outdoor Temp (°F)	Superheat at Compressor Suction (°F) Airflow = 5000 CFM										
	Indoor WB Temp (°F)										
	55	57	59	61	63	65	67	69	71	73	75
65	33.6	34.2	34.7	35.3	35.9	36.4	37.0	37.3	37.5	37.8	38.0
70	29.6	30.4	31.1	31.9	32.7	33.4	34.2	34.7	35.3	35.8	36.3
75	25.6	26.6	27.5	28.5	29.5	30.5	31.4	32.2	33.0	33.8	34.6
80	21.6	22.8	24.0	25.1	26.3	27.5	28.6	29.7	30.8	31.8	32.9
85	17.6	19.0	20.4	21.7	23.1	24.5	25.9	27.2	28.5	29.9	31.2
90	11.6	13.4	15.2	16.9	18.7	20.5	22.3	24.3	26.3	28.3	30.3
95	5.6	7.8	10.0	12.1	14.3	16.5	18.7	21.3	24.0	26.7	29.4
100	-	6.1	7.8	9.4	11.1	12.8	14.5	17.5	20.6	23.7	26.7
105	-	-	5.5	6.7	7.9	9.1	10.3	13.8	17.2	20.7	24.1
110	-	-	-	-	-	5.4	6.1	10.0	13.8	17.6	21.5
115	-	-	-	-	-	-	-	6.2	10.4	14.6	18.8

TABLE 57: 6.5 TON HIGH EFFICIENCY SUPERHEAT CHARGING

Outdoor Temp (°F)	Superheat at Compressor Suction (°F) Airflow = 2500 CFM										
	Indoor WB Temp (°F)										
	55	57	59	61	63	65	67	69	71	73	75
65	5.8	8.5	11.2	13.9	16.6	19.3	22.0	24.3	26.7	29.0	31.3
70	5.6	7.7	9.9	12.0	14.2	16.4	18.5	21.3	24.1	26.8	29.6
75	5.3	7.0	8.6	10.2	11.8	13.4	15.1	18.3	21.5	24.7	27.9
80	5.1	6.2	7.3	8.3	9.4	10.5	11.6	15.3	18.9	22.6	26.2
85	-	5.4	5.9	6.5	7.0	7.6	8.1	12.2	16.3	20.4	24.5
90	-	-	-	6.1	7.4	8.6	9.8	13.2	16.7	20.1	23.5
95	-	-	-	5.8	7.7	9.6	11.5	14.3	17.0	19.8	22.6
100	-	-	-	5.2	6.9	8.7	10.4	13.1	15.9	18.6	21.3
105	-	-	-	-	6.2	7.8	9.3	12.0	14.7	17.4	20.1
110	-	-	-	-	5.4	6.8	8.2	10.9	13.5	16.2	18.8
115	-	-	-	-	-	5.9	7.1	9.7	12.3	14.9	17.5

TABLE 58: 7.5 TON HIGH EFFICIENCY SUPERHEAT CHARGING

Outdoor Temp (°F)	Superheat at Compressor Suction (°F) Airflow = 3000 CFM										
	Indoor WB Temp (°F)										
	55	57	59	61	63	65	67	69	71	73	75
65	19.6	20.8	22.0	23.2	24.4	25.6	26.9	28.4	29.9	31.4	32.9
70	16.0	17.2	18.4	19.7	20.9	22.1	23.4	25.4	27.4	29.4	31.4
75	12.3	13.6	14.8	16.1	17.3	18.6	19.9	22.4	24.9	27.4	29.9
80	8.7	10.0	11.2	12.5	13.8	15.1	16.4	19.4	22.4	25.4	28.4
85	5.1	6.4	7.7	9.0	10.3	11.6	12.9	16.4	19.9	23.4	26.9
90	5.3	6.3	7.3	8.2	9.2	10.2	11.2	14.9	18.7	22.4	26.2
95	5.6	6.3	6.9	7.6	8.2	8.9	9.5	13.5	17.5	21.4	25.4
100	5.2	5.8	6.5	7.1	7.8	8.4	9.1	12.3	15.6	18.8	22.1
105	-	5.4	6.1	6.7	7.3	8.0	8.6	11.1	13.7	16.2	18.7
110	-	5.0	5.6	6.3	6.9	7.6	8.2	10.0	11.8	13.6	15.3
115	-	-	5.2	5.9	6.5	7.1	7.8	8.8	9.9	10.9	12.0

8.5 ton high efficiency unit uses TXV. Charge the unit to 10° subcooling.

10 ton high efficiency unit uses TXV. Charge the unit to 10° subcooling.

TABLE 59: 12.5 TON HIGH EFFICIENCY SUPERHEAT CHARGING

Outdoor Temp (°F)	Superheat at Compressor Suction (°F) Airflow = 5000 CFM										
	Indoor WB Temp (°F)										
	55	57	59	61	63	65	67	69	71	73	75
65	7.9	10.7	13.6	16.4	19.3	22.2	25.0	26.9	28.7	30.5	32.4
70	7.3	9.7	12.2	14.6	17.1	19.5	22.0	24.2	26.5	28.8	31.0
75	6.7	8.7	10.8	12.8	14.8	16.9	18.9	21.6	24.3	27.0	29.7
80	6.1	7.7	9.3	11.0	12.6	14.3	15.9	19.0	22.1	25.2	28.3
85	5.5	6.7	7.9	9.2	10.4	11.6	12.9	16.4	19.9	23.5	27.0
90	5.6	6.5	7.4	8.4	9.3	10.2	11.2	14.9	18.7	22.5	26.2
95	5.6	6.3	6.9	7.6	8.2	8.8	9.5	13.5	17.5	21.5	25.5
100	5.2	5.8	6.5	7.1	7.8	8.4	9.0	12.3	15.6	18.8	22.1
105	-	5.4	6.0	6.7	7.3	8.0	8.6	11.1	13.7	16.2	18.7
110	-	-	5.6	6.2	6.9	7.5	8.2	10.0	11.8	13.6	15.4
115	-	-	5.1	5.8	6.4	7.1	7.7	8.8	9.9	10.9	12.0

NORMAL MAINTENANCE

⚠ CAUTION

Prior to any of the following maintenance procedures, shut off all power to the unit to prevent personal injury.

Periodic maintenance normally consists of changing or cleaning filters and (under some conditions) cleaning the main burners of gas furnace units.

GENERAL

FILTERS

Inspect once a month. Replace disposable or clean permanent type as necessary. DO NOT replace permanent type with disposable.

MOTORS

Indoor fan and outdoor fan motors are permanently lubricated and require no maintenance.

The draft motors on gas furnace units are factory lubricated for an estimated 10 years of life.

OUTDOOR COIL

Dirt should not be allowed to accumulate on the outdoor coil surface or other parts in the air circuit. Cleaning should be as often as necessary to keep coil clean. Use a brush, vacuum cleaner attachment, or other suitable means. If water is used to clean coil, be sure power to the unit is shut off prior to cleaning. Service access is provided in the front and rear condenser compartment panels to provide improved access to the condenser coils.

⚠ WARNING

Do not remove service panels or attempt to clean the interior of the condenser section when the unit is powered and/or operating. Shut off all power to the unit prior to cleaning or maintenance of the condenser section internals.

NOTE: Exercise care when cleaning the coil so that the coil fins are not damaged. Do not permit the outdoor air discharge to be obstructed by overhanging structures of shrubs.

GAS FURNACE UNITS

BURNER

Periodically (at least annually at the beginning of each heating season) make a visual check of the main burner flame. If it is not possible to adjust for the proper flame, the burners may need cleaning.

BURNER CLEANING

Remove the burners from the furnace as explained in “BURNER/ORIFICE INSTRUCTIONS”. Clean burners by applying hot water along the top of the burners.

COMBUSTION AIR DISCHARGE

Visually inspect discharge outlet periodically to make sure that there is no buildup of soot and dirt. If necessary, clean the outlet to maintain adequate combustion air discharge.

CLEANING FLUE PASSAGES & HEATING ELEMENTS

With proper combustion adjustment, the heat exchanger tubes of a gas-fired furnace will seldom need cleaning. If the tubes should become sooted, they can be cleaned as follows:

1. Remove the burner assembly as outlined in “BURNER/ORIFICES INSTRUCTIONS”.
2. Remove the screws holding the flue collector box. Carefully remove the flue collector box.
3. Remove the flue baffles from the tube interiors.
4. Using a wire brush on a flexible wand, brush out the inside of each heat exchanger from the burner inlet and flue outlet ends.
5. Brush out the inside of the flue collector box and the flue baffles.
6. Run the wire brush into the flue exhaust tube from the flue collector end. Do not damage the flue exhaust screen, remove if necessary.
7. If soot build-up is particularly bad, remove the draft motor and clean the wheel and housing.
8. After brushing is complete, blow away all brushed areas with air or nitrogen. Vacuum as needed.
9. Replace parts in the reverse order that they were removed in Steps 1 through 3.
10. Assure that all seams on the vent side of the combustion system are airtight. Apply a high temperature (500°F+) sealing compound where needed.

TROUBLESHOOTING

⚠ WARNING

Troubleshooting of components may require opening the electrical control box with the power connected to the unit. ***Use extreme care when working with live circuits!*** *Check the unit nameplate for the correct line voltage and set the voltmeter to the correct range before making any connections with line terminals.*

When not necessary, shut off all electric power to the unit prior to any of the following maintenance procedures so as to prevent personal injury.

⚠ CAUTION

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation which could cause injury to person and/or damage unit components. Verify proper operation after servicing.

PREDATOR FLASH CODES

Various flash codes are utilized by the unit control board (UCB) to aid troubleshooting. Flash codes are distinguished by the short on and off cycle used (approximately 200ms on and 200ms off). To show normal operation, the control board flashes a 1 second on, 1 second off “heartbeat” during normal operation. This is to verify that the UCB is functioning correctly. Do not confuse this with an error flash code. To prevent confusion, a 1-flash, flash code is not used.

Current alarms are flashed on the UCB LED. The alarm history can be checked by pressing and releasing the ALARMS button on the UCB. The UCB will cycle through the last five (5) alarms, most recent to oldest, separating each alarm flash code by approximately 2 seconds.

In some cases, it may be necessary to “zero” the ASCD for the compressors in order to perform troubleshooting. To reset all ASCDs for one cycle, press and release the UCB TEST button once.

TABLE 60: UNIT CONTROL BOARD FLASH CODES

Flash Code	Description
On Steady	Control Failure - Replace Control
Heart Beat	Normal Operation
1 Flash	Not Applicable
2 Flashes	Control waiting ASCD*
3 Flashes	HPS1 - Compressor Lock out
4 Flashes	HPS2 - Compressor Lock out
5 Flashes	LPS1 - Compressor Lock out
6 Flashes	LPS2 - Compressor Lock out
7 Flashes	FS1 - Compressor Lock out
8 Flashes	FS2 - Compressor Lock out
9 Flashes	Ignition Control Locked Out/ Ignition Control Failure / Limit Switch Trip / No Jumper Plug in Heat Section
10 Flashes	Compressors Locked Out On Low Outdoor Air Temperature*
11 Flashes	Compressors Locked Out Because The Economizer Is Using Free Cooling*
12 Flashes	Fan Overload Switch Trip - Not Applicable On This Unit
13 Flashes	Compressor Held Off Due To Low Voltage*
14 Flashes	EEPROM Storage Failure (Control Failure)
OFF	No Power or Control Failure

*. These flash codes do not represent alarms.

TABLE 61: IGNITION CONTROL FLASH CODES

FLASHES	FAULT CONDITIONS	CHECK
STEADY ON	Control Failure	Control
HEARTBEAT	Normal Operation	
1	Not Applicable	
2	Pressure Switch Stuck Closed	Pressure Switch
3	Pressure Switch Failed To Close	Venter Pressure Switch Vent Blocked
4	Limit Switch Open	Main Limit AUX Limit
5	Flame Present With Gas Off First Stage Gas Valve Energized With W1 Off Second Stage Gas Valve Energized With First Stage Gas Valve Off	Gas Valve
6	Ignition Lockout	Gas Flow Gas Pressure Gas Valve Flame Sensor

TABLE 61: IGNITION CONTROL FLASH CODES

FLASHES	FAULT CONDITIONS	CHECK
STEADY OFF	No Power Or Control Failure	24VAC or Control

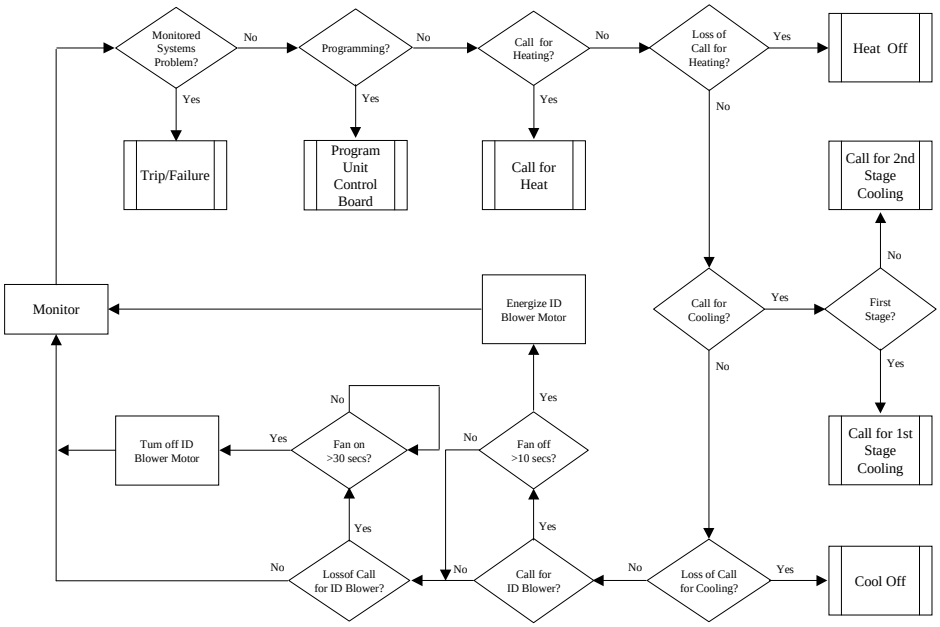


FIGURE 23 : BASIC TROUBLESHOOTING FLOWCHART

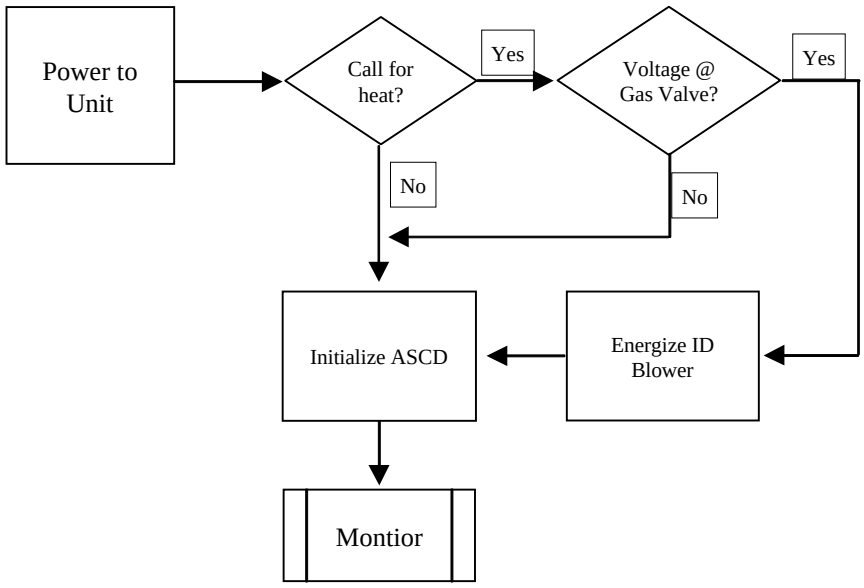
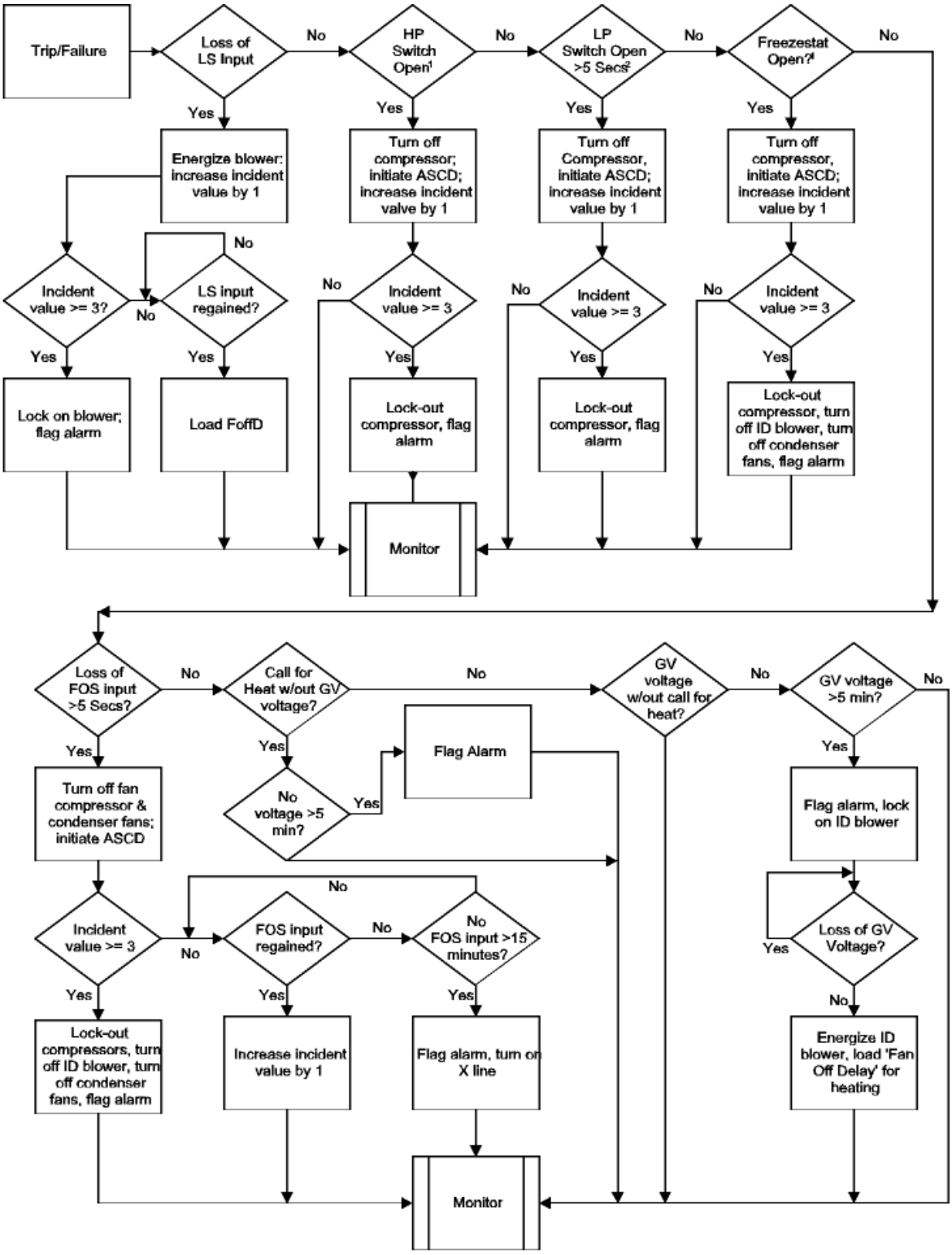


FIGURE 24 : POWER ON FLOW CHART



1 The control board only monitors the input when the compressor really is energized.
2 The low-pressure switch is not monitored for the first 30 seconds of compressor activity. The control board then monitors the switch to ensure it closes. If the switch remains open and additional 30 seconds, the control board turns off the associated compressor and initiates the ASCD. Once it has closed during the start up period, the control board no longer handles the low-pressure switch differently than other inputs.

FIGURE 25 : TRIP FAILURE FLOW CHART

COOLING OPERATIONS

On calls for cooling, if the compressors are operating but the supply air blower motor does not energize after a short delay (the room thermostat fan switch is in the “AUTO” position).

1. Turn the thermostat fan switch to the ON position. If the supply air blower motor does not energize, go to Step 3.

2. If the blower motor runs with the fan switch in the ON position but will not run after the first compressor has energized when the fan switch is in the AUTO position, check the room thermostat for contact between R and G in the AUTO position during calls for cooling.

3. If the supply air blower motor does not energize when the fan switch is set to ON, check that line voltage is being supplied to the contacts of the M3, contactor, and that the contactor is pulled in. Check for loose wiring between the contactor and the supply air blower motor.

4. If M3 is pulled in and voltage is supplied to M3, lightly touch the supply air blower motor housing. If it is hot, the motor may be off on internal protection. Cancel any thermostat calls and set the fan switch to AUTO. Wait for the internal overload to reset. Test again when cool.

5. If M3 is not pulled in, check for 24 volts at the M3 coil. If 24 volts are present at M3 but M3 is not pulled in, replace the contactor.

6. Failing the above, if there is line voltage supplied at M3, M3 is pulled in, and the supply air blower motor still does not operate, replace the motor.

7. If 24 volts is not present at M3, check that 24 volts is present at the UCB supply air blower motor terminal, “FAN”. If 24 volts is present at the FAN, check for loose wiring between the UCB and M3.

8. If 24 volts is not present at the “FAN” terminal, check for 24 volts from the room thermostat. If 24 volts are not present from the room thermostat, check for the following:

    a. proper operation of the room thermostat (contact between R and G with the fan switch in the ON position and in the AUTO position during operation calls), b. proper wiring between the room thermostat and the UCB, and c. loose wiring from the room thermostat to the UCB.

9. If 24 volts is present at the room thermostat but not at the UCB, check for proper wiring between the thermostat and the UCB, i.e. that the thermostat G terminal is connected to the G terminal of the UCB, and for loose wiring.

10. If the thermostat and UCB are properly wired, replace the UCB.

On calls for cooling, the supply air blower motor is operating but compressor #1 is not (the room thermostat fan switch is in the “AUTO” position).

1. If installed, check the position of the economizer blades. If the blades are open, the economizer is providing free cooling and the compressors will not immediately operate. If both stages of cooling are requested simultaneously and the economizer provides free cooling, following a short delay compressor #1 will be energized unless it is locked out. If compressor #1 is locked out, compressor #2 is energized. Compressor #2 is always energized in place of compressor #1 when compressor #1 is requested but locked out.

2. If no economizer is installed or the economizer is not opening to provide free cooling and compressor #1 does not energize on a call for cooling, check for line voltage at the compressor contactor, M1, and that the contactor is pulled in. Check for loose wiring between the contactor and the compressor.

3. If M1 is pulled in and voltage is supplied at M1, lightly touch the compressor housing. If it is hot, the compressor may be off on inherent protection. Cancel any calls for cooling and wait for the internal overload to reset. Test again when cool.

4. If M1 is not pulled in, check for 24 volts at the M1 coil. If 24 volts are present and M1 is not pulled in, replace the contactor.

5. Failing the above, if voltage is supplied at M1, M1 is pulled in, and the compressor still does not operate, replace the compressor.

6. If 24 volts is not present at M1, check for 24 volts at the UCB terminal, C1. If 24 volts is present, check for loose wiring between C1 and the compressor contactor.

7. If 24 volts is not present at the C1 terminal, check for 24 volts from the room thermostat at the UCB Y1 terminal. If 24 volts is not present from the room thermostat, check for the following: a) 24 volts at the thermostat Y1 terminal, b) proper wiring between the room thermostat and the UCB, i.e. Y1 to Y1, Y2 to Y2, and c) loose wiring from the room thermostat to the UCB.

8. If 24 volts is present at the UCB Y1 terminal, the compressor may be out due to an open high-pressure switch, low-pressure switch, or freezestat. Check for 24 volts at the HPS1, LPS1, and FS1 terminals of the UCB. If a switch has opened, there should be a voltage potential between the UCB terminals, e.g. if LPS1 has opened, there will be a 24-volt potential between the LPS1 terminals.

9. If 24 volts is present at the UCB Y1 terminal and none of the protection switches have opened, the UCB may have locked out the compressor for repeat trips. The UCB

should be flashing an alarm code. If not, press and release the ALARMS button on the UCB. The UCB will flash the last five alarms on the LED. If the compressor is locked out, cancel any call for cooling. This will reset any compressor lock outs.

NOTE: While the above step will reset any lockouts, compressor #1 may be held off for the ASCD. See the next step.

10. If 24 volts is present at the UCB Y1 terminal and none of the switches are open and the compressor is not locked out, the UCB may have the compressor in an ASCD. Check the LED for an indication of an ASCD cycle. The ASCD should time out within 5 minutes. Press and release the TEST button to reset all ASCDs.

11. If 24 volts is present at the UCB Y1 terminal and the compressor is not out due to a protective switch trip, repeat trip lock out, or ASCD, the economizer terminals of the UCB may be improperly wired. Check for 24 volts at the Y1 "OUT" terminal of the UCB. If 24 volts is present, trace the wiring from Y1 "OUT" for incorrect wiring. If 24 volts is not present at the Y1 "OUT" terminal, the UCB must be replaced.

12. *For units without economizers*:If 24 volts is present at the Y1 OUT terminal, check for 24 volts at the Y1 "ECON" terminal. If 24 volts is not present, check for loose wiring from the Y1 "OUT" terminal to the Mate-N-Lock plug, the jumper in the Mate-N-Lock plug, and in the wiring from the Mate-N-Lock plug to the Y1 "ECON" terminal.

13. *For units with economizers*: If 24 volts is present at the Y1 "OUT" terminal, check for 24 volts at the Y1 "ECON" terminal. If 24 volts is not present, check for loose wiring from the Y1 "OUT" terminal to the Mate-N-Lock plug, a poor connection between the UCB and economizer Mate-N-Lock plugs, loose wiring from the Mate-N-Lock plug to the economizer, back to the Mate-N-Lock plug, and from the Mate-N-Lock plug to the Y1 "ECON" terminal. If nothing is found, the economizer DME may have faulted and is failing to return the 24-volt "call" to the Y1 "ECON" terminal even though the economizer is not providing free cooling. To test, disconnect the Mate-N-Locks and jumper between the WHITE and YELLOW wires of the UCB's Mate-N-Lock plug. If compressor #1 energizes, there is a fault in the economizer wiring or DME.

14. The UCB can be programmed to lock out compressor operation during free cooling and in low ambient conditions. These options are not enabled by default. Local York distributors can test the UCB for this programming.

15. If none of the above corrected the error, test the integrity of the UGB. Disconnect the C1 terminal wire and jumper it to the Y1 terminal. DO NOT jump the Y1 to C1 terminals. If the compressor engages, the UCB has faulted.

16. If none of the above correct the error, replace the UCB.

On calls for the second stage of cooling, the supply air blower motor and compressor #1 are operating but compressor #2 is not (the room thermostat fan switch is in the "AUTO" position).

1. If installed, check the position of the economizer blades. If the blades are open, the economizer is providing free cooling. If the second stage of cooling is requested, following a short delay, compressor #1 will be energized unless it is locked out. Typically, compressor #2 is energized only during free cooling if the call for the second stage of cooling persists for 20 minutes.

2. Compressor #2 will not energize simultaneously with compressor #1 if a call for both stages of cooling is received. The UCB delays compressor #2 by 30 seconds to prevent a power surge. If after the delay compressor #2 does not energize on a second stage call for cooling, check for line voltage at the compressor contactor, M2, and that the contactor is pulled in. Check for loose wiring between the contactor and the compressor.

3. If M2 is pulled in and voltage is supplied at M2, lightly touch the compressor housing. If it is hot, the compressor may be off on inherent protection. Cancel any calls for cooling and wait for the internal overload to reset. Test again when cool.

4. If M2 is not pulled in, check for 24 volts at the M2 coil. If 24 volts is present and M2 is not pulled in, replace the contactor.

5. Failing the above, if voltage is supplied at M2, M2 is pulled in, and the compressor still does not operate, replace the compressor.

6. If 24 volts is not present at M2, check for 24 volts at the UCB terminal, C2. If 24 volts are present, check for loose wiring between C2 and the compressor contactor.

7. If 24 volts is not present at the C2 terminal, check for 24 volts from the room thermostat at the UCB Y2 terminal. If 24 volts is not present from the room thermostat, check for the following: a) 24 volts at the thermostat Y2 terminal, b) proper wiring between the room thermostat and the UCB, i.e. Y1 to Y1, Y2 to Y2, and c) loose wiring from the room thermostat to the UCB.

8. If 24 volts is present at the UCB Y2 terminal, the compressor may be out due to an open high-pressure switch, low-pressure switch, or freezestat. Check for 24 volts at the HPS2, LPS2, and FS2 terminals of the UCB. If a switch has opened, there should be a voltage potential between the UCB terminals, e.g. if LPS2 has opened, there will be 24 volts of potential between the LPS2 terminals.

9. If 24 volts is present at the UCB Y2 terminal and none of the protection switches have opened, the UCB may have locked out the compressor for repeat trips. The UCB should be flashing a code. If not, press and release the

ALARMS button on the UCB. The UCB will flash the last five alarms on the LED. If the compressor is locked out, remove any call for cooling at the thermostat or by disconnecting the thermostat wiring at the Y2 UCB terminal. This will reset any compressor lock outs.

NOTE: While the above step will reset any lock outs, compressor #1 will be held off for the ASCD, and compressor #2 may be held off for a portion of the ASCD. See the next step.

10. If 24 volts is present at the UCB Y2 terminal and none of the switches are open and the compressor is not locked out, the UCB may have the compressor in an ASCD. Check the LED for an indication of an ASCD cycle. The ASCD should time out within 5 minutes. Press and release the TEST button to reset all ASCDs.

11. The UCB can be programmed to lock out compressor operation during free cooling and in low ambient conditions. These options are not enabled by default. Local York distributors can test the UCB for this programming.

12. If none of the above corrected the error, test the integrity of the UGB. Disconnect the C2 terminal wire and jumper it to the Y2 terminal. DO NOT jump the Y2 to C2 terminals. If the compressor engages, the UCB has faulted.

13. If none of the above correct the error, replace the UCB.

On a call for cooling, the supply air blower motor and compressor #2 are operating but compressor #1 is not (the room thermostat fan switch is in the “AUTO” position).

1. Compressor #2 is energized in place of compressor #1 when compressor #1 is unavailable for cooling calls. Check the UCB for alarms indicating that compressor #1 is locked out. Press and release the ALARMS button if the LED is not flashing an alarm.

2. Check for line voltage at the compressor contactor, M1, and that the contactor is pulled in. Check for loose wiring between the contactor and the compressor.

3. If M1 is pulled in and voltage is supplied at M1, lightly touch the compressor housing. If it is hot, the compressor may be off on inherent protection. Cancel any calls for cooling and wait for the internal overload to reset. Test again when cool.

4. If M1 is not pulled in, check for 24 volts at the M1 coil. If 24 volts is present and M1 is not pulled in, replace the contactor.

5. Failing the above, if voltage is supplied at M1, M1 is pulled in, and the compressor still does not operate, replace the compressor.

6. If 24 volts is not present at M1, check for 24 volts at the UCB terminal, C1. If 24 volts is present, check for loose wiring between C1 and the compressor contactor.

7. If 24 volts is not present at the C1 terminal, check for 24 volts from the room thermostat at the UCB Y1 terminal. If 24 volts are not present at the UCB Y1 terminal, the UCB may have faulted. Check for 24 volts at the Y1 ECON terminal. If 24 volts is not present at Y1 “ECON”, the UCB has faulted. The UCB should de-energize all compressors on a loss of call for the first stage of cooling, i.e. a loss if 24 volts at the Y1 terminal.

8. If 24 volts are present at the UCB Y1 terminal, the compressor may be out due to an open high-pressure switch, low-pressure switch, or freezestat. Check for 24 volts at the HPS1, LPS1, and FS1 terminals of the UCB. If a switch has opened, there should be a voltage potential between the UCB terminals, e.g. if LPS1 has opened, there will be a 24-volt potential between the LPS1 terminals.

9. If 24 volts is present at the UCB Y1 terminal and none of the protection switches have opened, the UCB may have locked out the compressor for repeat trips. The UCB should be flashing a code. If not, press and release the ALARMS button on the UCB. The UCB will flash the last five alarms on the LED. If the compressor is locked out, remove any call for cooling. This will reset any compressor lock outs.

NOTE: While the above step will reset any lock outs, compressor #2 will be held off for the ASCD, and compressor #1 may be held off for a portion of the ASCD. See the next step.

10. If 24 volts is present at the UCB Y1 terminal and none of the switches are open and the compressor is not locked out, the UCB may have the compressor in an ASCD. Check the LED for an indication of an ASCD cycle. The ASCD should time out within 5 minutes. Press and release the TEST button to reset all ASCDs.

11. If 24 volts is present at the UCB Y1 terminal and the compressor is not out due to a protective switch trip, repeat trip lock out, or ASCD, the economizer terminals of the UCB may be improperly wired. Check for 24 volts at the Y1 “OUT” terminal of the UCB. If 24 volts is present, trace the wiring from Y1 “OUT” for incorrect wiring. If 24 volts is not present at the Y1 “OUT” terminal, the UCB must be replaced.

12. *For units without economizers*: If 24 volts is present at the Y1 “OUT” terminal, check for 24 volts at the Y1 “ECON” terminal. If 24 volts is not present, check for loose wiring from the Y1 “OUT” terminal to the Mate-N-Lock plug, the jumper in the Mate-N-Lock plug, and in the wiring from the Mate-N-Lock plug to the Y1 “ECON” terminal.

For units with economizers:If 24 volts is present at the Y1 “OUT” terminal, check for 24 volts at the Y1 “ECON” terminal. If 24 volts is not present, check for loose wiring from the Y1 “OUT” terminal to the Mate-N-Lock plug, a poor connection between the UCB and economizer Mate-N-Lock plugs, loose wiring from the Mate-N-Lock plug to the economizer, back to the Mate-N-Lock plug, and from the Mate-N-Lock plug to the Y1 “ECON” terminal. The economizer board may have faulted and is not returning the 24 volts to the Y1 “ECON” terminal even though the economizer is not providing free cooling. To test the economizer board, disconnect the Mate-N-Locks and jumper between the WHITE and YELLOW wires of the UCB’s Mate-N-Lock plug.

13. The UCB can be programmed to lock out compressor operation during free cooling and in low ambient conditions. These options are not enabled by default. They can be checked by local York distributors.

14. If none of the above corrected the error, test the integrity of the UGB. Disconnect the C1 terminal wire and jumper it to the Y1 terminal. DO NOT jump the Y1 to C1 terminals. If the compressor engages, the UCB has faulted.

15. If none of the above correct the error, replace the UCB.

GAS FURNACE OPERATIONS

On calls for heating, the draft motor operates and the furnace lights but the supply air blower motor does not energize after a short delay (the room thermostat fan switch is in “AUTO” position).

⚠ WARNING

The furnace may shut down on a high temperature condition during the procedure. If this occurs, the UCB energize the supply air blower motor until the high temperature limit has reset. Caution should be used at all times as the supply air blower may energize regardless of the room thermostat fan switch position.

1. Place the thermostat fan switch in the “ON” position. If the supply air blower motor energizes, go to Step 9.

2. If the supply air blower motor does not energize when the fan switch is set to “ON,” check that line voltage is being supplied to the contacts of the M3 contactor, and that the contactor is pulled in. Check for loose wiring between the contactor and the supply air blower motor.

3. If M3 is pulled in and voltage is supplied at M3, lightly touch the supply air blower motor housing. If it is hot, the motor may be off on inherent protection. Cancel any thermostat calls and set the fan switch to “AUTO”, wait for the internal overload to reset. Test again when cool.

4. If M3 is not pulled in, check for 24 volts at the M3 coil. If 24 volts is present at M3 but M3 is not pulled in, replace the contactor.

5. Failing the above, if there is line voltage supplied at M3, M3 is pulled in, and the supply air blower motor still does not operate, replace the motor.

6. If 24 volts is not present at M3, check that 24 volts is present at the supply air blower motor terminal on the UCB. If 24 volts is present at the UCB terminal, check for loose wiring between the UCB and M3.

   a. If 24 volts is not present at the UCB supply air blower motor terminal, check for 24 volts from the room thermostat. If 24 volts is not present from the room thermostat, check for the following:
   proper operation of the room thermostat (contact between R and G with the fan switch in the “ON” position and in the “AUTO” position during operation calls), b) proper wiring between the room thermostat and the UCB, and c) loose wiring from the room thermostat to the UCB.

7. If 24 volts is present at the room thermostat but not at the UCB, check for proper wiring between the thermostat and the UCB, i.e. that the thermostat G terminal is connected to the G terminal of the UCB, and for loose wiring.

8. If the thermostat and UCB are properly wired, replace the UCB.

9. If the blower motor runs with the fan switch in the “ON” position but does not run shortly after the furnace has ignited when the fan switch is in the “AUTO” position, check the room thermostat for contact between R and G during “W1” calls.

On calls for heating, the supply air blower operates but the draft motor does not (the room thermostat fan switch is in the “AUTO” position).

1. The draft motor has inherent protection. If the motor shell is hot to the touch, wait for the internal overload to reset.

2. If the motor shell is cold with the room thermostat calling for heat, check for line voltage at the motor leads. If line voltage is present, replace the draft motor.

3. If line voltage is not present, check for line voltage on the ignition control at the “inducer” terminal draft motor relay (DMR or DMC) contacts in the main control box and check to see if the (DMR or DMC) is pulled in.

The draft motor runs but the furnace does not light and the spark ignitor does not spark.

1. Check for 24 volts at the spark ignitor from the ignition control board (ICB). Check the 24-volt wiring from the ICB to the spark ignitor. Check for 24 volts at the ICB spark ignitor terminal.

2. Check the ground wiring for the ICB and the gas valve is intact and making good electrical connection. Check the ceramic insulator on the spark ignitor for breaks or cracks. Replace the spark ignitor if damaged.

3. With the draft motor running, check for 24 volts at the pressure switch terminal on the ICB. If not present, check for 24 volts on the terminal from the pressure switch. If present, go to step 4. If 24 volts is not present, the either pressure or rollout switch is not closed. Or the draft motor is not sufficiently evacuating the heat exchanger tubes or the pressure switch has failed. Check the operation of the pressure switch. Check the line voltage to the unit; if line voltage is low, call the local power company. If the problem persists, the draft motor may need replacement.

4. If the furnace is hot, it may be out on a high temperature limit open; wait for limit reset.

5. If all are intact replace the ICB.

The draft motor runs and the spark ignitor sparks at the burner, but the burner does not ignite and a gas odor is not detected at the draft motor outlet.

1. Check to ensure gas is being supplied to the unit. Confirm that the gas pressure to the unit is within the proper limits as described in the “POST START CHECKLIST”.

2. Check the voltage at the gas valve and at the gas valve terminals on the ICB. Check all wiring between the ICB and the gas valve. Check to make sure the ground connections are intact.

3. If 24 volts is present, remove the pilot burner and the orifice. The removal procedure is described in “BURNER/ORIFICE INSTRUCTIONS.” Inspect the orifice for obstruction. If it is clear, replace the gas valve.

Main burners light but exhibit erratic flame characteristics.

4. Check the main burner orifices for obstruction and alignment. The removal procedure is described in “BURNER/ORIFICE INSTRUCTIONS.” Clean or replace burner orifices and burners as needed.

NOTES

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